GEO T Series

T4805 5° Tangent Array Module

T2815 15° Tangent Array Module

CD18 Directional Sub-bass

User Manual

GEO Technology is radically new thinking

The GEO R&D Project has, to date, resulted in the following patent applications:

- The GEO Hyperboloid Reflective Wavesource™ differs radically from the megaphone-variant type horns you know and love (or hate). "Tried and true" methods will produce entirely unexpected results. HRW technology produces precise and predictable results.
- The Configurable Directivity Flange. A waveguide that allows the operator to alter its behaviour. An unprecedented NEXO development that is easy to use – once you know how and when.
- The Directivity Phase Device needs no operator input to function, but it is reassuring to know that the coupling of the midrange of the system is considered as important as the high frequencies…
- GEO's DSP-driven Cardioid Dipolar Sub-bass devices are a new approach to controlling LF/VLF acoustic energy.

GEO is not hard to use when you understand how…

The technology behind GEO is revolutionary, but it is grounded in years of practical experience with the problems of delivering high quality professional sound to large audiences at high SPL levels. The GEO toolbox includes GEOSoft -a simple yet powerful and highly predictive design tool. The array assembly system is keyed to the design software and will easily enable you to deploy your design with great precision. The NX242 Digital TDcontroller provides driver protection and system optimization as well as DSP-driven cardioid pattern control for the T4805 Tangent Array Module and the CD18 Cardioid Dipole Sub-bass.

GEO is a high precision system

The GEO HRW™ controls acoustic energy more precisely than other multiple element waveguides. It also makes GEO less forgiving of mistakes. Whilst conventional horns never combine into a coherent array, they may deliver acceptable results even if the design and deployment of the system is less than optimal. This is not the case with GEO where careless installation produces catastrophic results.

A GEO Tangent Array is not a "line array"

GEO Technology is equally effective in designing and deploying tangent horizontal arrays or curved vertical arrays. For best results in a specific application the user needs to know how multi-speaker arrays interact with audience geometry, along with the benefits and drawbacks of curved vertical arrays and horizontal arrays.

Curved vertical tangent arrays require different design techniques

For the past 20 years, sound reinforcement professionals have worked with horizontal arrays that use conventional horns to deliver [more or less] 'equal power to equal *angles*'. Curved vertical arrays are designed to deliver [more or less] equal power to equal *areas*'. When arrays use conventional horns, the lack of precision, overlap and interference masks errors in array design and aiming. The highly precise GEO wavesource responds accurately, consistently and predictably to the design and deployment of a curved vertical tangent array. This is why the GEO rigging system is designed to control angular splay to 0.01° precision.

GEO curved vertical tangent arrays require different operational techniques

Over the years, system designers and operators have developed a number of signal processing techniques to disguise and partly overcome the limitations of horn design. "Frequency shading," "amplitude shading," "system tuning," all of these are tools of the advanced sound system operator. NONE OF THESE TECHNIQUES ARE APPLICABLE TO GEO TANGENT ARRAYS. Instead of enhancing the array's performance they will severely degrade it.

Take time to learn how to get great results with GEO Technology. It is an investment that will pay off in more satisfied clients, more efficient operating procedures and more recognition for your skill as a sound system designer and operator. A comprehensive understanding of GEO theory, tangent arrays, and specific features of the GEO T Series will help you to operate your system at its full potential.

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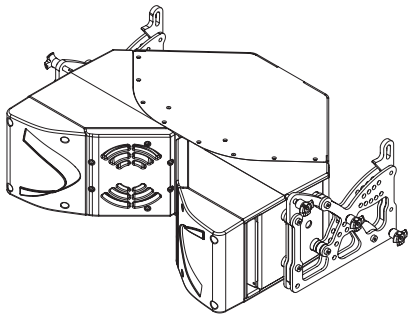
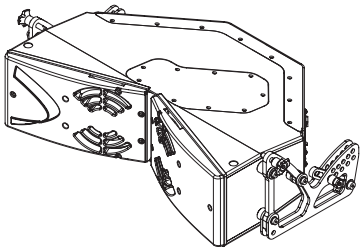
1 INTRODUCTION

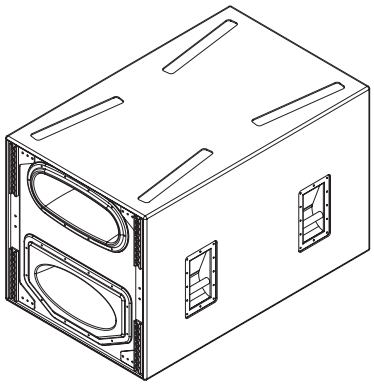
Thank you for selecting a NEXO GEO T Series Tangent Array .System This manual is intended to provide you with necessary and useful information about your GEO System, which includes the following products:



- T4805 5° Tangent Array Module. 4x 8" (20cm) Neodymium Hi-flux 16 Ohm LF Drivers (two forward-facing LF/MF, two rear-facing LF) and one 3" voice coil, 1.4" Throat Neodymium 16 Ohm HF Driver with a 5° Hyperboloid Reflective Wavesource™. The main building block for curved vertical tangent arrays.

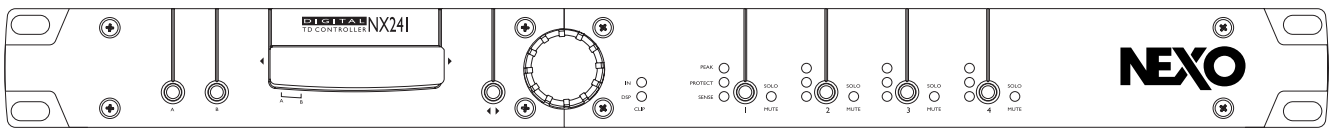


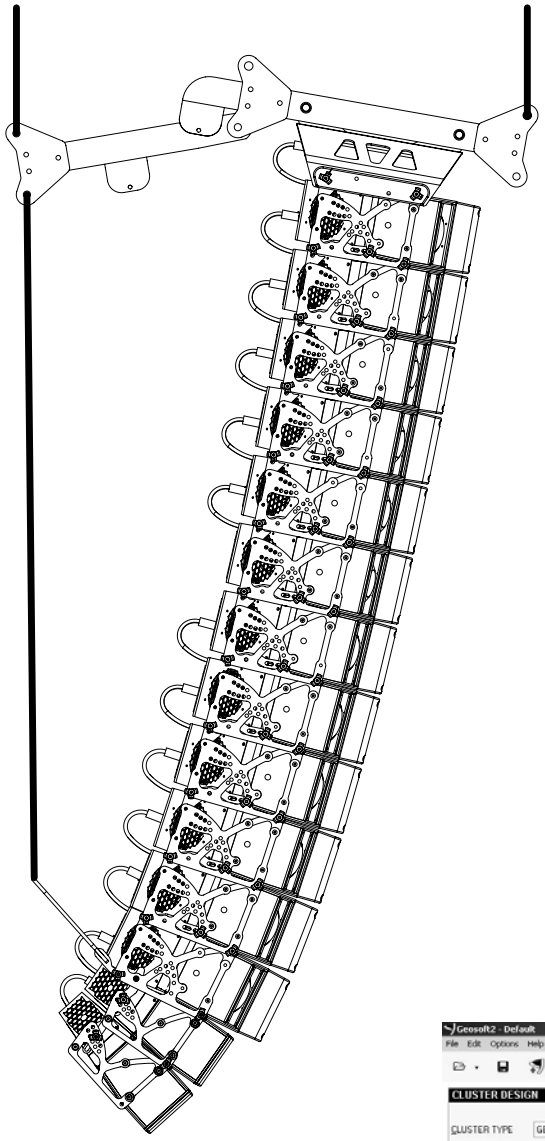
- T2805 15° Tangent Array Module. 2 x 8" (20cm) Neodymium Hi-flux 16 Ohm LF Drivers (forward-facing LF/MF), 2 x rear passive acoustic resistance radiator and a 3" voice coil, 1.4" Throat Neodymium 16 Ohm HF Driver with a 15° Hyperboloid Reflective Wavesource™. The near-field building block for curved vertical tangent arrays.



- CD18 Cardioid Dipole Sub-bass. Two 18" (45cm) Long Excursion Neodymium 6 Ohm Drivers, each controlled by one DSP channel, producing a 110° x 110° Super-Cardioid pattern. Can be used in flown or ground-stacked configurations.

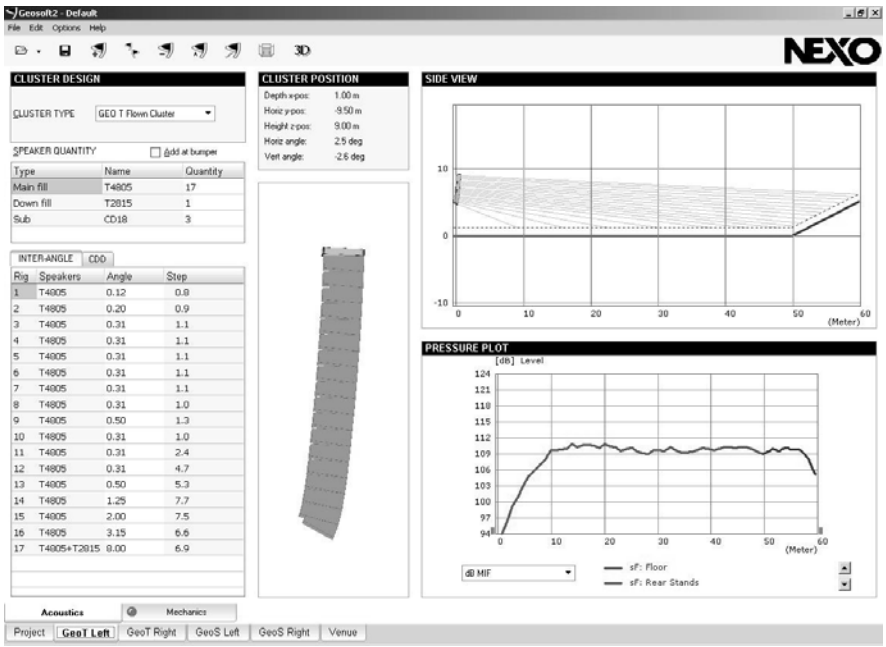
- NX242 Digital TDcontroller. Provides comprehensive control of GEO T Series loudspeakers in multiple configurations. For a complete description of this unit, please refer to the NX242 User Manual. The NX242 DSP algorithms and parameters are fixed in software and are updated regularly: please consult the NEXO web site (www.NEXO.fr or www.NEXO-sa.com) for the latest software releases.





- GEO Array Flying System. A fully integrated and accurate flying system that provides safe, flexible and simple means of flying GEO Tangent Arrays. NOTE: GEO Tangent Arrays control the dispersion of acoustic energy with a high degree of precision. Inclinometers and laser aiming tools are essential to ensure proper audience coverage when installing a GEO Tangent Array.
- GEOSoft Array Design Software simplifies the design and implementation of vertical tangent GEO arrays. Please consult the NEXO web site (www.NEXO.fr or www.NEXO-sa.com) for the latest software releases.

Please devote your time and attention to reading this manual. A comprehensive understanding of GEO theory, tangent arrays, and specific features of the GEO T Series will help you to operate your system at its full potential.



2 GEO T GENERAL SET-UP INSTRUCTIONS

2.1 Speaker Wiring

2.1.1 GEO T4805 & T2815 connectors

GEO T's are connected to power amplifiers via one AP6 Male Connector (GEOT-612M) on a link cable that is stowed in the rear vent port. One EP6 Female Chassis (GEOT-613F) on the back connector panel is used as output to feed the next GEO T.

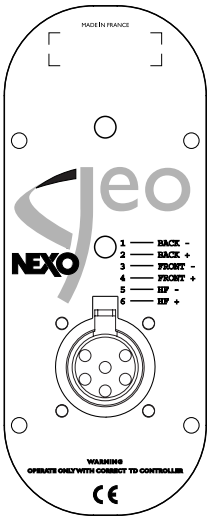
A wiring diagram is printed on the connection panel located on the back of each cabinet. The EP6 / AP6 connectors are linked in parallel within the enclosures (see the Connections Diagrams section of this manual).

EP6/AP6 Pin #	1 / 2	3 / 4	5 / 6-
GEO T4805	Rear 8" LF - 32 Ω 1 Negative – 2 Positive	Front 8" LF/MF - 32 Ω 3 Negative – 4 Positive	1.4" HF – 16 Ω 5 Negative – 6 Positive
GEO T2815	Not connected Through	Front 8" LF/MF – 32 Ω 3 Negative – 4 Positive	1.4" HF – 16 Ω 5 Negative – 6 Positive

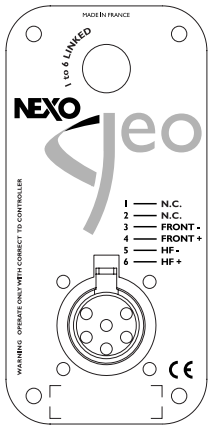
IMPORTANT

NEVER USE a male connector to feed the signal:

High voltages and currents are delivered from the amplifiers to the GEO T system.



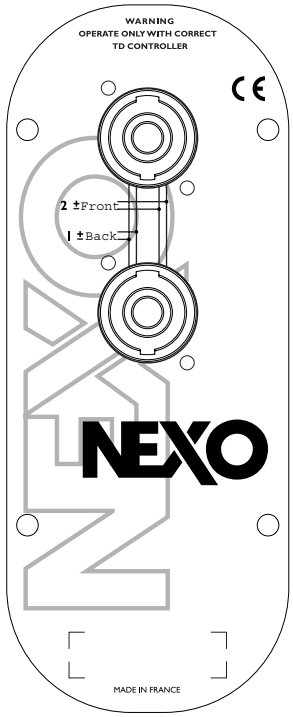
GEO T4805 REAR CONNECTOR PANEL



GEO T2815 REAR CONNECTOR PANEL

2.1.2 CD18 connectors

The CD18 are connected to power amplifiers via NL4FC SPEAKON connectors (not supplied). A wiring diagram is printed on the connection panel located on the back of each cabinet. The in/out pins of the SPEAKON sockets are identified. The sockets are connected in parallel within the enclosures (see the Connections Diagrams section of this manual).



CD18 REAR CONNECTOR PANEL

NL4FC #	1- / 1+-	2- / 2+
CD18	Rear 18" VLF - 8 Ω 1(-) Negative – 1(+) Positive	Front 18" VLF - 8 Ω 2(-) Negative – 2(+) Positive

2.1.3 Cabling

NEXO recommends the exclusive use of multi-conductor cables to connect the system: the cable kit is compatible with all the cabinets, and there is no possible confusion between LF, MF and HF sections.

Cable choice consists mainly of selecting cables of the correct sectional dimension (size) in relation to the load resistance and the cable length. Too small a cable section will increase both its serial resistance and its capacitance; this reduces the electrical power delivered to the loudspeaker and can also induce response (damping factor) variations.

For a serial resistance less or equal to 4% of the load impedance (damping factor = 25), the maximum cable length is given by:

$$L_{max} = Z \times S \qquad S \text{ in } mm^2, Z \text{ in Ohm}, L_{max} \text{ in meters}$$

The table below indicates these values, for 3 common sizes.

Load Impedance (Ω)	2	3	4	6	8	12	16
Cable section	**Maximum Length (meters)**						
1,5 mm² (AWG #14)	3	4.5	6	9	12	18	24
2,5 mm² (AWG #12)	5	7.5	10	15	20	30	40
4 mm² (AWG #10)	8	12	16	24	32	48	64

2.1.4 Examples:

- The GEO T4805 LF section has a 32 Ohm nominal impedance, so 6x GEO T4805 LF section wired in parallel will present a 32/6 = 5.3 Ohm load impedance. The maximum acceptable 2x2.5 mm^2 (AWG #12) cable length L_{max} for such a cluster is 13.25 meters.
- The CD18 subwoofer has a 2 x 8 Ohm nominal impedance, therefore 2 CD18s wired in parallel will present a 2 x 4 Ohm load impedance. The maximum acceptable 2x4 mm^2 (AWG #10) cable length L_{max} is then 16 meters.

IMPORTANT

Long speaker cables induce capacitive effects – up to hundreds of pF depending on the quality of the cable - with a high-pass effect on high frequencies. If long speaker cables must be used, ensure that they do not remain coiled while in use.

2.2 Amplifier Selection

NEXO recommends high power amplifiers in all cases. Budget constraints are the only reason to select lower power amplifiers. A lower power amplifier will not reduce the chances of driver damage due to over-excursion, and may actually increase the risk of thermal damage due to sustained clipping. If an incident occurs on an installation without protection, the fact that amplifiers only generating half their rated output power (-3dB) are used will not change anything in respect of possible damage. This is due to the fact that the RMS power handling of the weakest component in the system is always 6 to 10 dB lower than the amplifier rating.

2.2.1 GEO T4805 recommended amplification

GEO T4805 is rated for very high power handling and has a 16 Ohm (HF) or 32 Ohm (LF Rear / LF/MF Front) nominal impedance.

These high impedance values allow connection of up to 6 cabinets in parallel for each amplifier channel. For such setup :

- HF section: NEXO recommends that the amplifier should be capable of delivering 2700 Watts into a 3 Ohm load.
- LF Rear section: NEXO recommends that the amplifier should be capable of delivering 5200 Watts into a 6 Ohm load (typically the same amplifier as for the HF section but in Bridged Mono mode)
- LF/MF front section: NEXO recommends that the amplifier should be capable of delivering 5200 Watts into a 6 Ohm load (typically the same amplifier as for the HF section but in Bridged Mono mode).

2.2.2 GEO T2815 recommended amplification

GEO T2815 is rated for very high power handling and has a 16 Ohm (HF) or 32 Ohm (LF/MF) nominal impedance.

These high impedance values allow connection of up to 6 cabinets in parallel for each amplifier channel For such setups:

- HF section: NEXO recommends that each amplifier channel should be capable of delivering 2700 Watts into a 2 Ohm load.
- LF/MF section: NEXO recommends that the amplifier should be capable of delivering 5200 Watts into a 4 Ohm load (typically the same amplifier as for the HF section but in Bridged Mono mode).

2.2.3 CD18 Power recommended amplification

The CD18 requires two amplifier channels delivering separately processed signals to produce its directional pattern.

NEXO recommends that each amplifier channel dedicated to CD18 should be capable of delivering 1000 to 2000 Watts into an 8 Ohm load.

Using the same amplifier model as those used for the GEO T will allow connection of up to 2 CD18 in parallel to one amplifier (Stereo Mode).

2.3 Current rating

It is very important that the amplifier behaves correctly under low load conditions. A speaker system is reactive by nature: on transient signals like music it will require four to ten times more instantaneous current than its nominal impedance would indicate. Amplifiers are generally specified by continuous RMS power into resistive loads, however the only useful information about current capacity is the specification into a 2 Ohm load. It is possible to perform an amplifier listening test by loading the amps with twice the number of cabinets considered for the application (2 speakers per channel instead of one, 4 instead of 2) and running the amps up to the onset of clipping. If the signal does not noticeably deteriorate, the amplifier is well adapted (overheating after approximately ten minutes is normal but thermal protection must not operate too quickly after starting this test).

2.4 Amplifier settings

2.4.1 Gain value

Gain is the key to correct alignment of the system. It is especially important to know the gain of all amplifiers used in your set-up. The tolerance should be about ±0.5 dB. In practice this can be difficult to achieve because:

- Some amplifier brands have an identical input sensitivity for models of different power rating (this infers a different voltage gain for each model). For example, a range of amplifiers with different power outputs, all having a published input sensitivity of 775mV/0dBm or 1.55V/+6dBm, will have a wide range of actual gains – the higher the power, the greater the gain.
- Various other brands may offer constant gain but only within a given product range, for example they may fit fixed input sensitivity only on their semi-professional amps.
- Even if a manufacturer applies the constant gain rule to all models, the value selected will not necessarily be the same as that chosen by other manufacturers.
- Some products can exhibit manufacturing tolerances for the same model of ±1dB or more. Some amplifiers may have been modified, possibly without any label indicating the new values. Others may have gain switches fitted internally where it is impossible for the user to verify the actual setting without opening the amplifier casing.
- In cases where you don't know the gain of your amplifier (or want to check it) please follow this procedure:
    1) Unplug any loudspeakers from the amplifier outputs
    2) With a signal generator, feed a sine wave at 1000Hz at a known voltage (say 0.5V) to the input of the amplifier under test
    3) Measure the voltage at the output of the amplifier
    4) Calculate the gain using the formula Gain = 20 * LOG10(Vout/Vin).

Some examples:

GainVin	20dB	26dB	32dB	37dB (1.4V sensitivity / 1350Wrms)
0.1V	1V	2V	4V	7.1V
0.5V	5V	10V	20V	35.4V
1V	10V	20V	40V	70.8V

Remember that constant sensitivity settings will give a different gain value when the amplifier power is different.

NEXO recommends low gain amplifiers: +26dB is recommended, as it is at the same time adequately low and quite common amongst amplifier manufacturers. This gain setting improves signal to noise ratio and allows all preceding electronic equipment, including the NX242 TDcontroller, to operate at optimum level. Remember that using a high gain amplifier will raise the noise floor proportionally.

2.4.2 Operating Mode

Most two channel amplifiers available on the pro-audio market have the following operating modes:

- Stereo: two fully independent channels deliver identical power into identical loads
- NEXO recommends Stereo Mode for HF sections when paralleling 6 GEO T series modules (2 x 6 HF per amplifier), and for CD18 amplification.
- Bridge-Mono: the second signal channel processes the same input as the first channel, but with reversed phase. The (single) load is connected between the two positive channel outputs using a suitable connection. While the total output of the amplifier remains the same, the available output voltage, the minimum impedance that can be connected and the voltage gain are doubled as compared with stereo operation. Typically, only channel 1 input is active. Positive and negative output connections vary depending on amplifier manufacturers.

IMPORTANT

When in Bridge-Mono mode, check your amplifier user manual for proper connection of outputs 1(+) and (2+) in relation to input phase.

- NEXO recommends Bridge Mono Mode for LF Rear and LF/MF Front sections when paralleling 6 GEO T series modules (1 x 6 LF rear per amplifier, 1 x 6 LF/MF front per amplifier).
- Parallel-mono: the output terminals of the two channels are configured in parallel using an internal relay. The (single) load is connected either to the output of channel 1 or to that of channel 2 (as if in stereo). While the total output of the amplifier remains the same the output voltage level is also the same as in stereo mode. The minimum impedance that can be connected is reduced by half due to the fact that current capability is doubled. Typically, only channel 1 input is active.
- NEXO does not recommend Parallel-Mono Mode for any GEO T or CD18 amplification.

2.4.3 Advanced protection

Some high-end amplifiers may include signal processing functions similar to those found in the NX242 TDcontroller ("loudspeaker offset integration", "limiter", "compressor," etc.). Moreover, when this processing is digital, computation latency time can introduce a few milliseconds delay from input to output. These functions are not adapted to specific system requirements and may interfere with the complex protection algorithms used in the NX242.

NEXO do not advise using other protection systems in conjunction with the NX242 and they should be disabled.

IMPORTANT

For proper system protection, no latency time should be introduced between the output of the NX242 TDcontroller and the input of loudspeakers through use of DSP modules such as internal amplifier signal processing.

2.5 Example

For a 12 GEO T4805 and 4 CD18 cluster, and considering an amplifier model which is capable of delivering 1 x 6000W into 4 Ohm or 2 x 3000W into 2 Ohm or 2 x 2000W into 4 Ohm, NEXO recommends the following quantities and settings:

- HF: 1 amplifier, 6 x GEO T4805 HF per channel, mode switch in Stereo position, Gain switch in 26 dB gain position, all dynamic or filter processing switches off.
- LF/MF front: 2 amplifiers, 6 x GEO T4805 LF/MF per amplifier, mode switch in Bridge Mono position, Gain switch in 26 dB gain position, all dynamic or filter processing switches off.
- LF rear: 2 amplifiers, 6 x GEO T4805 LF Rear per amplifier, mode switch in Bridge Mono position, Gain switch in 26 dB gain position, all dynamic or filter processing switches off.

- CD18 rear: 1 amplifier in stereo mode, 2 CD18 rear per amplifier channel, mode switch in Stereo position, Gain switch in 26 B gain position, all dynamic or filter processing switches off.
- CD18 front: 1 amplifier in stereo mode, 2 CD18 front per amplifier channel, mode switch in Stereo position, Gain switch in 26 B gain position, all dynamic or filter processing switches off.

Which gives a total of 7 identical amplifiers for such a cluster.

IMPORTANT

Former NX241 TDcontroller GEO T presets Gain structure has changed from load 2.13 to load 2.14.

- **Loads 2.13 and below: the NX242 expects all amplifiers to have the same overall gain; add 6 dB gain to the HF section to compensate for LF rear and LF/MF rear sections bridge operating mode 6 dB gain.**
- **Loads 2.14 and above: all amplifier gain switches should be set at 26 dB (as in the example above); the NX242 compensates for the bridge operating mode 6 dB voltage gain on LF rear and LF/MF front sections.**

3 GEO T RIGGING PROCEDURE

Before proceeding with assembly of GEO T arrays, please ensure that the components are present and undamaged. A component list is appended to this manual. In the event of any shortage, please contact your supplier.

For maximum efficiency the GEO T rigging system requires three experienced persons for set-up: typically one motor hoist operator, and one GEO T operator per side of the array. Good synchronisation and crosscheck between the operators are key elements for a reliable and safe set-up.

3.1 SAFETY FIRST

GeoT / CD18 Rigging System has been approved by Certification Organization RWTÜV. Structural computations, test reports, certificates are available in Geosoft2 or at Nexo ( ) upon request.

We include this section to remind you of safe practice when flying the GEOT / CD18 system. Please read it carefully. However, user must always apply his or her knowledge, experience and common sense. If in any doubt, seek advice from your supplier or NEXO agent.

This manual offers guidance only for GEOT / CD18 loudspeaker systems. References in this manual to other rigging equipment such as motor hoists, steels, shackles etc. are made to clarify the description of GEOT / CD18 procedures. The user must ensure that operators are properly trained by other agencies in the use of these items.

The GEOT / CD18 Rigging System has been optimised for the deployment of curved vertical tangent arrays of GEO T4805 / T2815 / CD18 loudspeakers. Vertical angle adjustment between cabinets has been limited to specific settings to ensure correct acoustic coupling.

The GEOT / CD18 Rigging System is a professional precision tool set, and should be handled with extreme care. Only persons who are fully conversant with the operation of the GEOT / CD18 Rigging System and provided with suitable safety equipment should deploy GEO Arrays. Misuse of the GEOT / CD18 Rigging System could lead to dangerous consequences.

Used and maintained correctly, the GEOT / CD18 Rigging System will give many years of reliable service in portable systems. Please take the time to read and understand this manual. Always use GEOSoft2 to determine the optimum angle settings for a particular venue, hang point and curved vertical GEOT / CD18 array. Applied forces and moments are strongly cabinet quantity and angle configuration dependent. Cluster configuration must be implemented and validated in Geosoft2 prior to installation.

3.1.1 Flown Systems Safety

- Always inspect all the rigging components and cabinets for damage before assembly. Pay special attention to the lifting points, and safety clips. If you suspect that any of the components are damaged or defective, DO NOT USE THE AFFECTED PARTS. Contact your supplier for replacements.
- Read this manual carefully. Also be familiar with the manuals and safe working procedures for any ancillary equipment that will be used with the GEOT / CD18 Rigging System.
- Applied forces and moments are strongly cabinet quantity and angle configuration dependent. Cluster configuration must be implemented and validated in Geosoft2 prior to installation.
- Ensure that all local and National regulations regarding the safety and operation of flying equipment are understood and adhered to. Information on these regulations can usually be obtained from Local Government Offices.
- When deploying a GEOT / CD18 system always wear protective headwear, footwear and eye protection.
- Do not allow inexperienced persons to handle a GEOT / CD18 system. Installation personnel should be trained in loudspeaker flying techniques and should be fully conversant with this manual.

- Ensure that motor hoists, hoist control systems and ancillary rigging components are currently certified as safe and that they pass a visual inspection prior to use.
- Ensure that public and personnel are not allowed to pass beneath the system during the installation process. The work area should be isolated from public access.
- Never leave the system unattended during the installation process.
- Do not place any object, no matter how small or light, on top of the system during the installation procedure. The object may fall when the system is flown and is likely to cause injury.
- Secondary safety steels must be installed once the system has been flown to the operating height. Secondary steels must be fitted irrespective of requirements of the local safety standards applicable to the territory.
- Ensure that the system is secure and prevented from pivoting around the motor hoist.
- Avoid any form of excessive dynamic loading to the assembly (structural computations on GeoT Rigging System are based on a 1/1.2 factor for hoist or motor acceleration).
- NEVER attach any item to the GEOT / CD18 system other than the GEOT / CD18 accessories.
- When flying outdoor systems ensure that the system is not exposed to excessive wind or snow loads and is protected from rainfall.
- The GEOT / CD18 Rigging System requires regular inspection and testing by a competent test centre. NEXO recommend that the system is load tested and certified annually or more frequently if local regulations require.
- When de-rigging the system ensure that the same duty of care is given to the procedure as for the installation. Pack GEOT / CD18 components carefully to prevent damage in transit.

3.1.2 Ground Stacking Safety

Statistically, many more injuries occur due to unstable ground stacked PA systems than those associated with flown systems. There are several reasons for this fact, however the message is clear:

- Always survey the supporting structure upon which a ground stack is to be built. Always look beneath PA wings to inspect the deck support and if necessary ask for the stage scrims and dressings be removed to allow access.
- If the stage surface slopes, as it does in some theatres, ensure that the system is prevented from sliding forwards due to vibration. This may require the fitting of timber battens to the stage floor.
- For outdoor systems ensure that that the system is protected from wind forces which might cause the ground stack to become unstable. Wind forces can be huge, especially upon large systems, and should never be underestimated. Observe meteorological forecasts, calculate the “worst case” effect upon the system prior to erection and ensure that the system is secured appropriately.
- Take care when stacking cabinets. Always employ safe lifting procedures and never attempt to build stacks without sufficient personnel and equipment.
- Never allow anyone, whether operators, artists or members of the public to climb onto a ground stacked PA system. Anyone who needs to climb over 2m high should be fitted with suitable safely equipment including a clip-on harness. Please refer to local Health and Safety legislation in your territory. Your dealer can help with advice on access to this information.
- Apply the same attention to all safety matters when de-stacking systems.
- Be aware that safety procedures are as important in the truck and in the warehouse as they are at the venue.

3.1.3 Contacts

Correct training is fundamental to safe practise when working with loudspeakers flying systems. NEXO recommend that users contact local industry associations for information on specialist course.

Information for International training agencies can be obtained by contacting either:

The Production Services Association (PSA),
School Passage,
Kingston-upon-Thames,
KT1 SDU Surrey,
ENGLAND
Telephone: +44 (0) 181 392 0180

Rigstar Training and Testing Center
82 Industrial Dr. Unit 4
Northampton, Massachusetts 01060 U.S.A.
Phone: 413-585-9869 -- Fax: 413-585-9872
school@rigstar.com

ESTA
Entertainment Services & Technology Association
875 Sixth Avenue, Suite 1005
NEW YORK, NY 10001 USA
Phone: 212-244-1505 – Fax: 212-244-1502
info@esta.org - www.esta.org

3.2 General Description

Each GEO T Array Module includes an individual rigging system, which is mounted at the NEXO factory.

Six BLGEOT12-30 push-pins are provided with the GEO T4805.

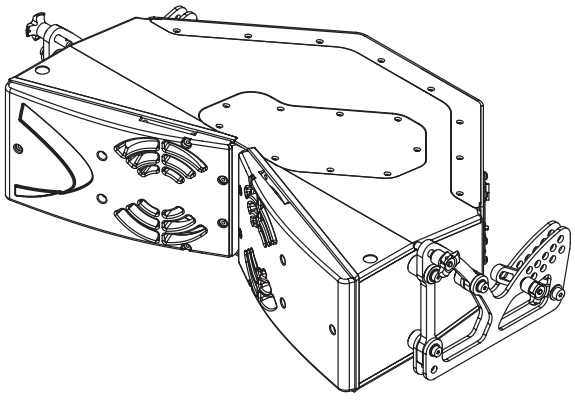
Four BLGEOT12-30 push-pins are provided with the GEO T2815.

All holes on GEO T side rigging plates are 12mm diameter, matching the push-pins which are 12mm diameter x 30mm length.

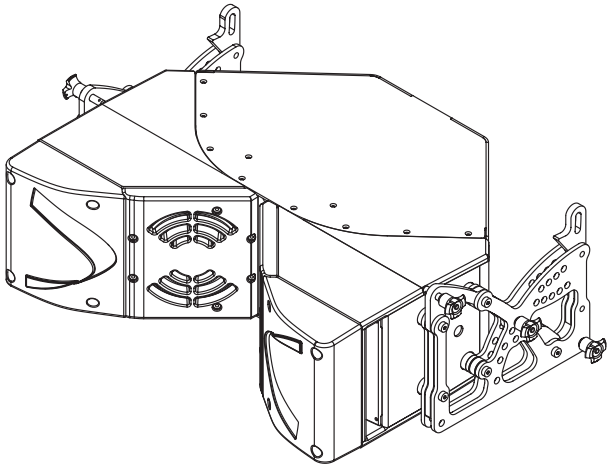
IMPORTANT

Provided push-pins are specifically rated.

Never use other push-pins than the ones provided with the GEO T components



GEO T2815



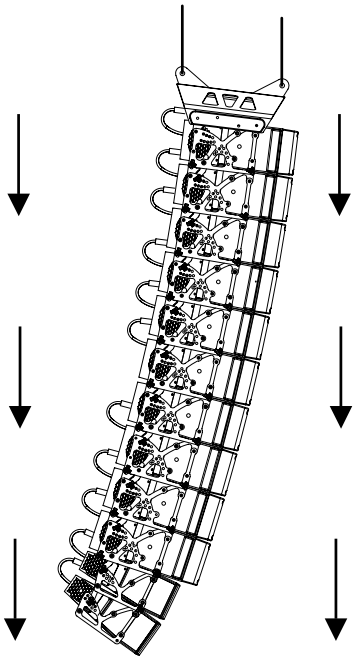
GEO T4805

GEO T angle sequences follow logarithmic scales. Angle setting values are:

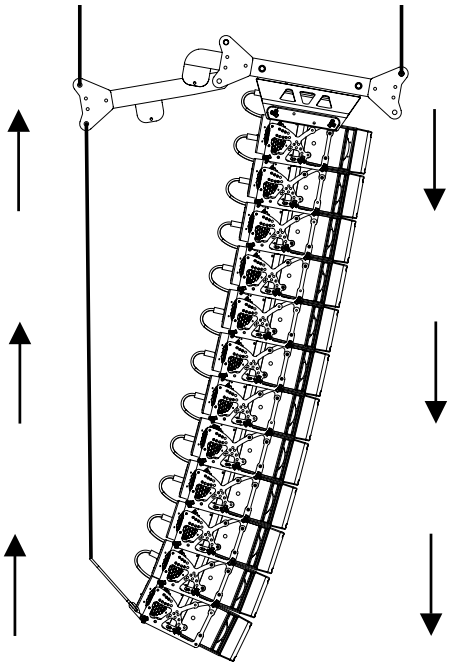
- Bumper to GEO T4805 : 0°
- GEO T4805 to GEO T4805: 0.125° - 0.20° - 0.315° - 0.50° - 0.80° - 1.25° - 2.0° - 3.15° - 5.0°
- GEO T4805 to GEO T2815: 6.30° - 8.00° - 10.0°
- GEO T2815 to GEO T2815: 6.30° - 8.00° - 10.0° - 12.5° - 15°

The GEO T rigging system has two operating modes:

- Tension mode: the force of gravity sets angles between upper and lower cabinets. When the array is lifted into position each cabinet opens automatically to the correct angle.
- Compression mode: pull-back force applied between the extreme bottom cabinet and the top bumper set angles between cabinets. When the array is lifted into position all cabinets are at 0° and it is only when the pull-up force is applied that the correct angles are obtained. Compression mode can be applied either with articulated kelping beam ("Compression Mode – Full Kelping Beam") or with fix beam and chain lever hoist ("Compression Mode – Half Kelping Beam").



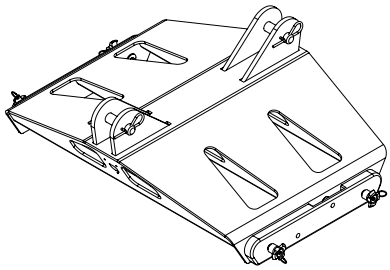
TENSION MODE



COMPRESSION MODE

3.3 "Tension Mode" Setup

Tension mode is restricted to small bumper initial angle settings (+/- ~10°, depending on configuration), and does not require any other accessory than the GEO T bumper (GEOT-BUMPER).



In order to increase initial angle settings to +/- ~15° (depending on configuration), GEO T bumper can be connected to front beam of GEO T Kelping Beam (GEOT-KELPBEAM).

To be lifted in tension mode, the GEO T bumper requires either:

- one motor hoist and a bridle;
- or two motor hoists (easier initial angle setting);

In both cases, ensure that the motors are properly rated.

IMPORTANT

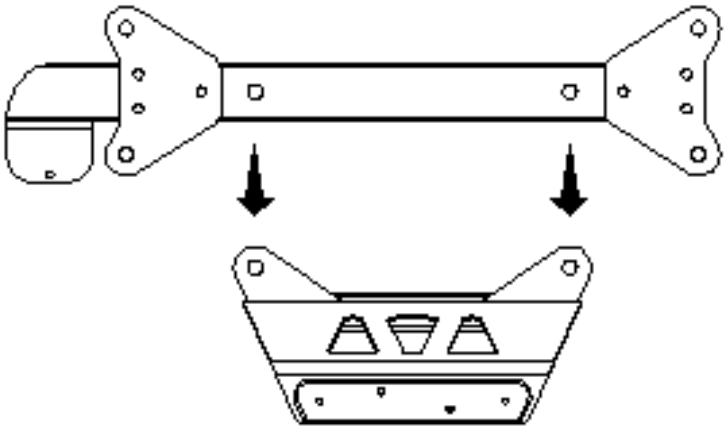
Motor hoists must be rated to support the entire cluster weight.

For arrays of 6 to 18 cabinets, 1 tonne motor hoists are sufficient.

Arrays of 18 cabinets and above should be supported with 2-tonne capacity motor hoists.

3.3.1 Front Kelping beam to bumper

- Disconnect Rear Beam from Front Beam by removing connecting axis. Store Rear Beam.
- Link the motor hoists to the Kelping Beam using front and rear upper axis (fixed beam), and ensure that these axes are properly locked with the "R" clips supplied.
- Lift the Kelping Beam and position the bumper below it.
- Lower the Kelping beam so that the front beam load pin holes are aligned with the bumper load pin holes (see drawing).



KELPING BEAM TO BUMPER SETUP

- Connect the Kelping Beam to the bumper with the two axes through the corresponding holes (see drawing above) and ensure that these are properly locked with the "R" clips.

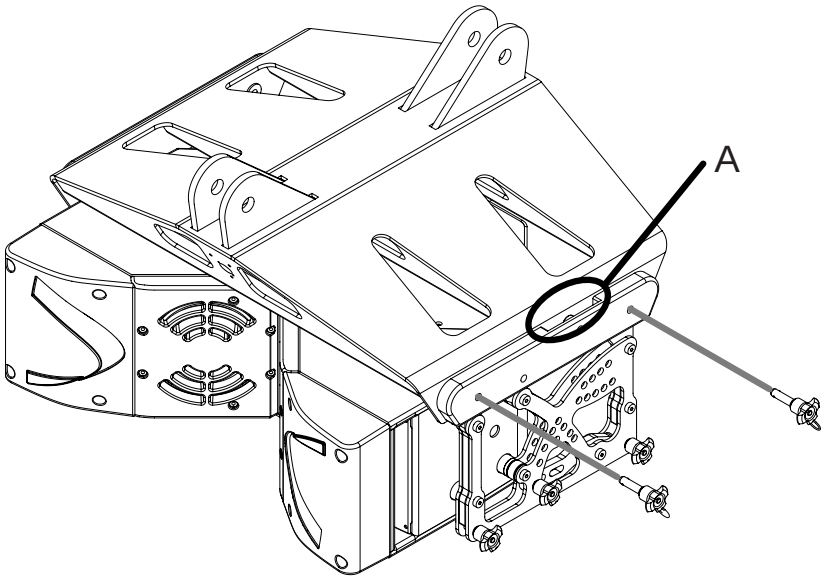
3.3.2 Bumper to first GEO T4805 assembly

4 push-pins (BLGEOT12-35, 12mm diameter x 35 mm length) connect the top GEO T4805 to the bumper.

IMPORTANT

These 4 push-pins are slightly longer than the ones used to connect GEO T Array modules (35mm length instead of 30mm).

Never use the GEO T 12mm x 30mm push-pins to connect the top GEO T4805 to the bumper.



BUMPER TO FIRST GEO T4805 ASSEMBLY

- Position the bumper on the first GEO T4805 so that the bumper side slot (A) is at the rear.
- Link the GEO T4805 to the bumper using the four 12mm x 35mm push-pins provided with the bumper; check that all push-pins are in the locked position.
- Link the motor hoists to the bumper using front and rear lifting points, and ensure that the bumper lifting pins properly locked with the "R" clips provided.
- Ensure that no objects (rolls of tape, spare pins etc.) have been placed accidentally on the top of the bumper as they might fall when system is lifted.

3.3.3 First to second GEO T4805

The linking bar has two oblong holes. When the linking bar is in "tension mode" position, the upper oblong hole is used for 1.25°, 2.00°, 3.15° and 5.00° angle settings, and the lower oblong hole is used for 0.125°, 0.20°, 0.315°, 0.5° and 0.8° angle settings.

The angle between a cabinet and the one below it is adjusted using the linking bar from the upper cabinet and the tension mode setting holes in the lower cabinet.

- Lift bumper and top GEO T4805 assembly and position the next GEO T4805 below the assembly.
- Lower the bumper and top GEO T4805 assembly carefully until the first and second GEO T4805 side rigging plates locate. Use front flanges and side vent ports to guide the assembly.

IMPORTANT

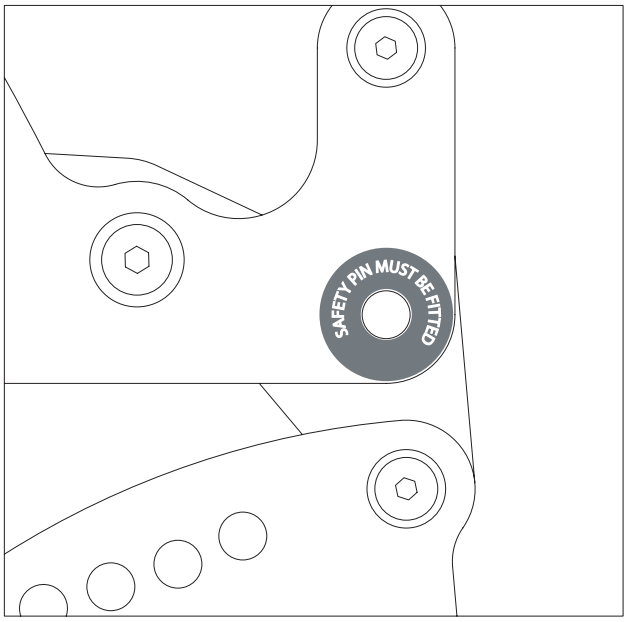
Take extreme care to make sure that hands and fingers are clear of the cabinets and rigging components when the cabinets are brought together. Careless operation can cause injury.

- Fix the two GEO T4805's by inserting one 12mm x 30 mm push-pin in the hole marked "SAFETY PIN MUST BE FITTED" on each side of the cabinet (see figure below).

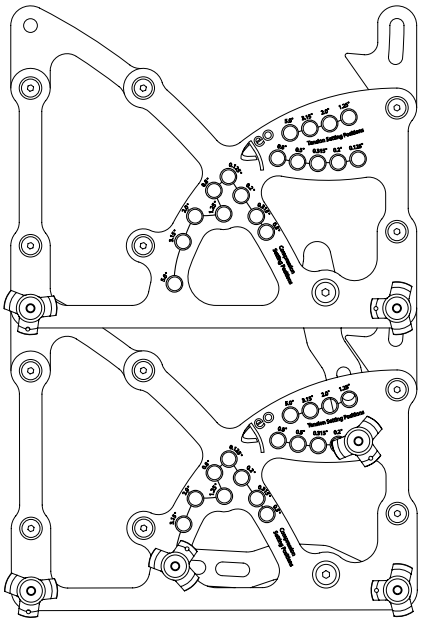
IMPORTANT

Always insert locking pins into the two "SAFETY PIN MUST BE FITTED" holes first.

- Insert two additional 12mm x 30mm push-pins in the front pivot point holes (see figure below).

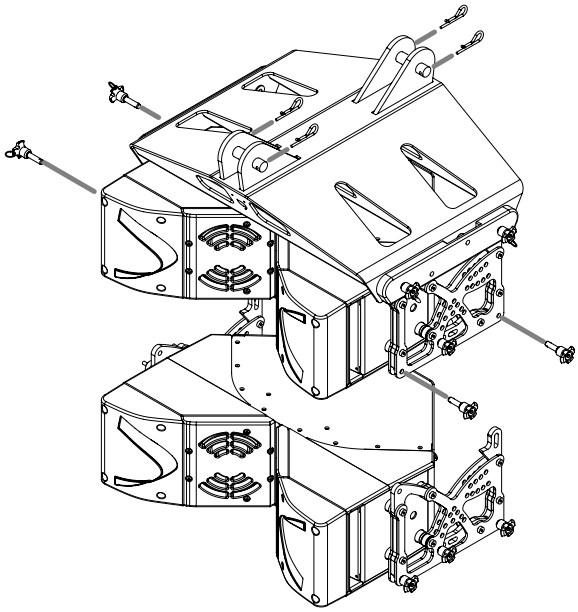


"SAFETY PIN MUST BE FITTED" HOLE



GEO T4805: RIGGING PLATES IN TENSION MODE

- Lift the bumper and the two first GEO T4805 to a height that allows convenient access to the linking bars and angle setting holes.
- The top GEO T4805's linking bars must be rotated downwards and into the lower GEO T4805's side rigging plate (see drawing).
- One operator must then lift the rear of the bottom GEO T while the angle settings push-pins are inserted by the second operator on each side of the cabinet.
- Once the angle setting push-pins are inserted, lower the rear of the lower GEO T: the angle between the two GEO T4805's is now correct.
- Check that all push-pins are locked and that angle settings are identical on both sides.



FIRST GEO T4805 TO SECOND GEO T4805 ASSEMBLY

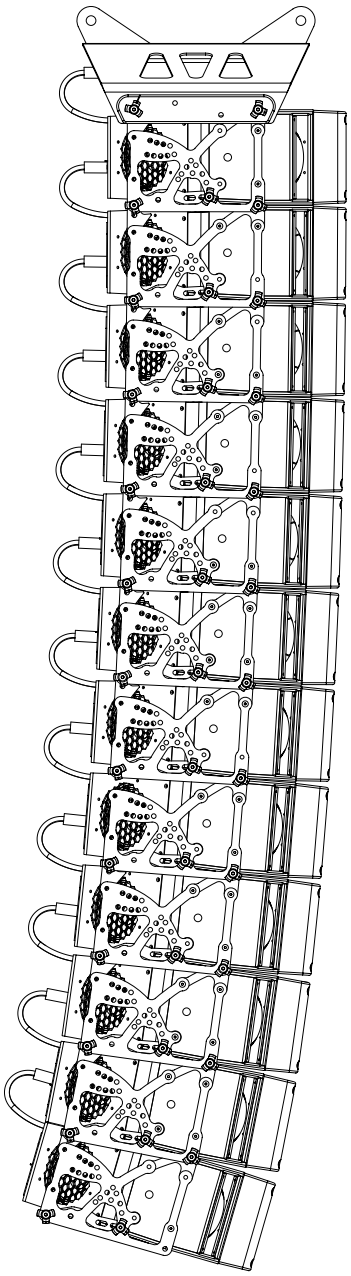
3.3.4 Subsequent GEO T4805's

- Repeat the above section steps, until you have positioned six GEO T4805's.
- Fix the speaker cable to the bumper, and connect it to the top GEO T4805.
- Connect the five speaker links.
- Check the six cabinets according to the Checklist procedure described in the following section

IMPORTANT – Tension Mode

DO NOT attempt to make any changes to the linking bars while the system is in tension or while it is being lifted or lowered.

DO NOT attempt to correct any angle mistakes without removing the tension load from the system. For small arrays, this can be achieved by carefully landing the array and allowing the cabinets to close together, supported from above by the motor hoist. Take care during this procedure to keep hands and fingers clear of the rigging system.



12 GEO T 4805 cluster set in tension mode

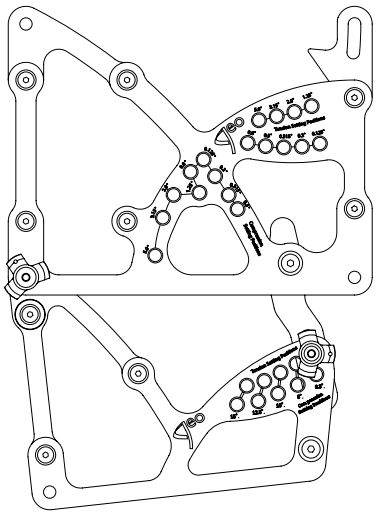
3.3.5 Last GEO T4805 to first GEO T2815

IMPORTANT

Unlike GEO T 4805, GEO T2815 does not have the 0° safety position.

The linking bar has two oblong holes. When the linking bar is in "tension mode" position, the upper oblong hole and the upper hole series is used for 6.3°, 8.00° and 10.0° angle settings.

- Lift the GEO T4805 array and position the GEO T2815 below the assembly.
- Using two operators, align the GEO T2815 with the lowest GEO T4805 so that the pivot point positions coincide. The profiles of the 'male' part of the GEO T2815 and the 'female' part of the GEO T4805 rigging accessories are designed to align the pivot holes correctly.
- Link the bottom GEO T4805 and GEO T2815 by inserting one 12mm x 30 mm push-pin in the front pivot point hole on each side of the cabinet (see figure).



- Lift the bumper and GEO T4805 at a height that allows convenient access to the linking bars and angle setting holes.
- Lift the rear of GEO T2815 and insert push-pins into the desired angle setting hole. The centre of gravity of the GEO T2815 is close to the pivot point and it is very easy to rotate the cabinet to the desired angle.
- Once the angle setting push-pins are inserted, release the rear of the GEO T2815: the angle between the last GEO T4805 and the first GEO T2815 is correct.
- Check that all push-pins are locked and that angle settings are identical on either side.

3.3.6 First to second GEO T2815

In “tension mode” position, the upper oblong hole and the upper hole series is used for 6.3°, 8.00°, 10.0°, 12.5° and 15° angle settings.

- Repeat the steps described in 3.3.4 until all GEO T2815 are positioned.
- Connect the speaker links.
- Check the bottom cabinets according to the Checklist procedure described later in this manual.

3.3.7 Positioning the cluster

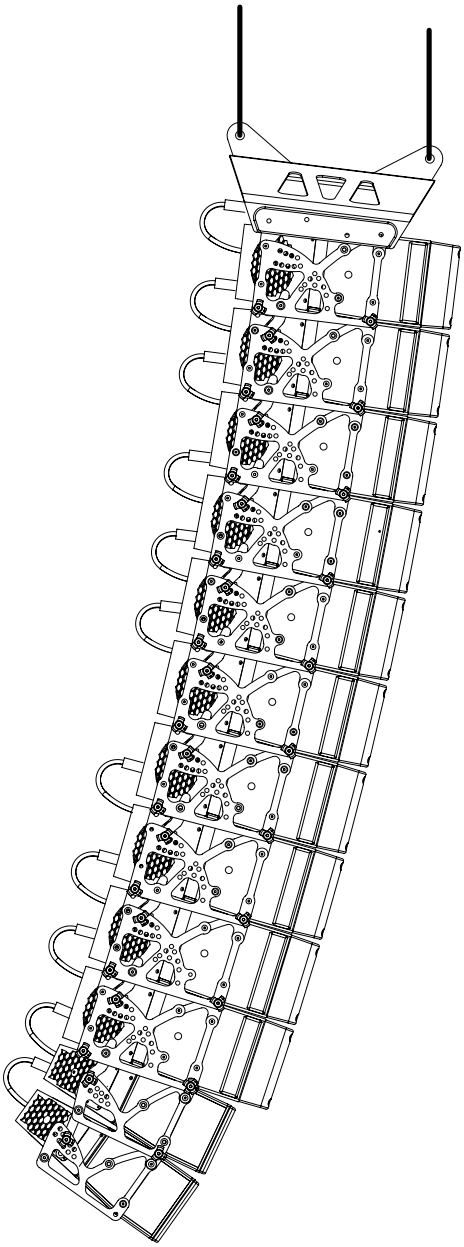
- If one motor hoist only is used, the bridle chain length must be adjusted for the correct bumper angle prior to cluster lift.
- Lift the GEO T array to the height determined in GeoSoft (GeoSoft array height definition is for the top surface of the topmost cabinet).
- Adjust the bumper angle as determined in GeoSoft by lowering or lifting rear motor hoist (so that the front height does not change).
- Check all GEO T angles with an inclinometer (cumulative error should always be lower than 0.5°).
- Once the bumper is in definitive position a secondary safety steel must be fitted (this secondary safety steel should link the bumper to a suitable point in the supporting structure)

IMPORTANT

The requirements for secondary safety systems vary with territories. However, the secondary safety steel MUST have a SWL equivalent to or greater than the dynamic weight of the rigging system.

3.3.8 De-rigging and loading out

Taking the system down is just a case of doing the reverse procedure to flying the array. However, there are some important factors to consider.



10 GEO T 4805 + 2 GEO T 2815 SET IN TENSION MODE

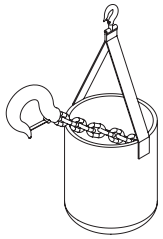
- Lower the array until the bottom cabinet is just off the floor and close to horizontal position.
- Link cables must be disconnected and stowed away in the recesses in the rear of each cabinet.
- NB : As the system is lowered it is good practise to disconnect as many loudspeaker cables as can be reached without climbing the array. This ensures that a cable should not be accidentally forgotten when the system is separated. Damage to the connector will occur should this mistake be made.
- While holding the rear of the bottom GEO T 2815, remove the linking bar push-pins.
- Remove front push-pins linking the two last cabinets while supporting the bottom cabinet. Remove the bottom GEO T2815.
- Repeat for all GEO T2815.
- NB: when one cabinet is removed, always balance front and rear motor hoists so that the next cabinet is close to horizontal position.
- While holding the rear of the bottom GEO T4805, remove the linking bar push-pins and rotate the linking bar back to the “Compression Setting Position” at 5° so that the bottom cabinet sits flat in the flight case.

- All other GEO T4805's should have their linking bars returned to 0.125° position to ensure that the cabinets stay vertical when landing.
- Position the flight case underneath the array and carefully lower the array into the flight case, taking care not to catch any parts in the case.
- NB: When lowering the system into the flight case, alignment is easier if two operators lift the flight case onto the bottom of the system as it is lowered. This ensures that the lowest cabinet does not hit the flight case extrusion if the case is to be mis-aligned.
- Remove the front and rear push-pins linking the two last cabinets, and carefully lift the array using both motor hoists until the array is clear.
- Repeat the procedure for all cabinets.
- Remove the GEO T bumper. Remember to replace all the pins back in their respective beams.

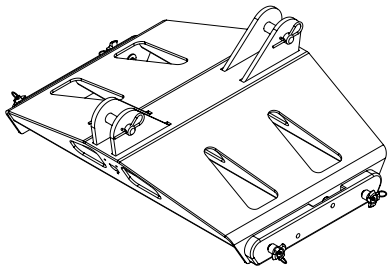
3.4 "Compression Mode Full Kelping Beam" Setup

"Compression mode – Full Kelping Beam" requires the following accessories:

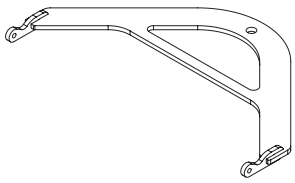
- GEO T Main Bumper (GEOT-BUMPER)
- GEO T Kelping Beam (GEOT-KELPBEAM)
- GEO T Bottom Bumper (GEOT-BTBUMPER)
- GEO T Kelping Chain (GEOT-BCCH)



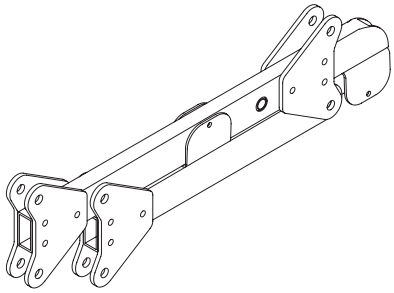
GEO T KELPING CHAIN



GEO T MAIN BUMPER



GEO T BOTTOM BUMPER



GEO T FOLDED KELPING BEAM

To be lifted in compression mode, the GEO T bumper requires two motor hoists.

IMPORTANT

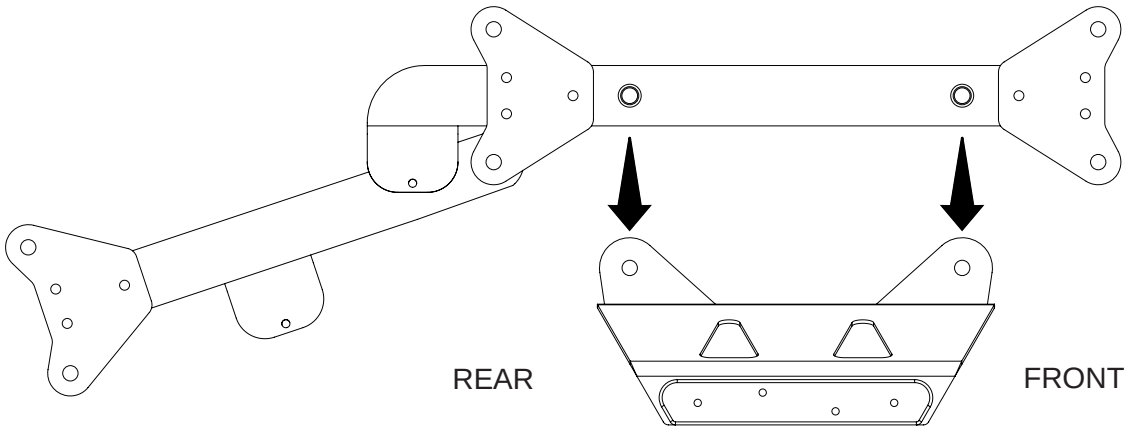
Front and rear motor hoists must be rated to support the entire cluster weight.
For arrays of 6 to 18 cabinets, 1 tonne motor hoists are sufficient.
Arrays of 18 cabinets and above should be supported with 2-tons capacity motor hoists.

IMPORTANT

The front motor hoist must be positioned so that there is enough space in front of the future cluster location to allow the cluster to swing forward without obstruction.

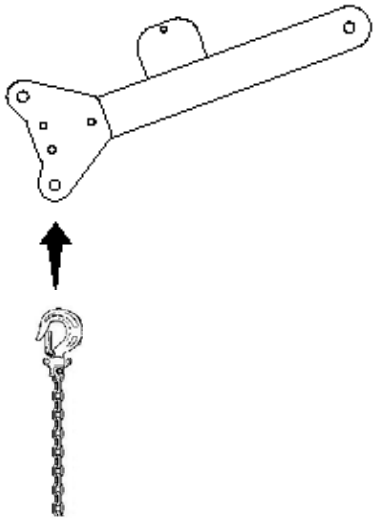
3.4.1 Kelping beam to bumper

- Link the motor hoists to the Kelping Beam using the front upper axis (fixed beam) and rear upper axis (articulated beam), and ensure that these axes are properly locked with the “R” clips supplied.
- Lift the Kelping Beam and position the bumper below it.
- Lower the Kelping beam so that the front beam load pin holes are aligned with the bumper load pin holes (see drawing).



KELPING BEAM TO BUMPER SETUP

- Connect the Kelping Beam to the bumper with the two axes through the corresponding holes (see drawing above) and ensure that these are properly locked with the “R” clips.
- Attach one end of the GEO T Kelping Chain to the Kelping Beam rear lower axis.
- NB : the GEO T Kelping chain has a clutch assembly 0.5 meter from one end. This is the end that connects to the bottom GEO T4805, and a small bag is provided for excess chain.



ATTACHING THE GEO T KELPING CHAIN TO THE KELPING BEAM

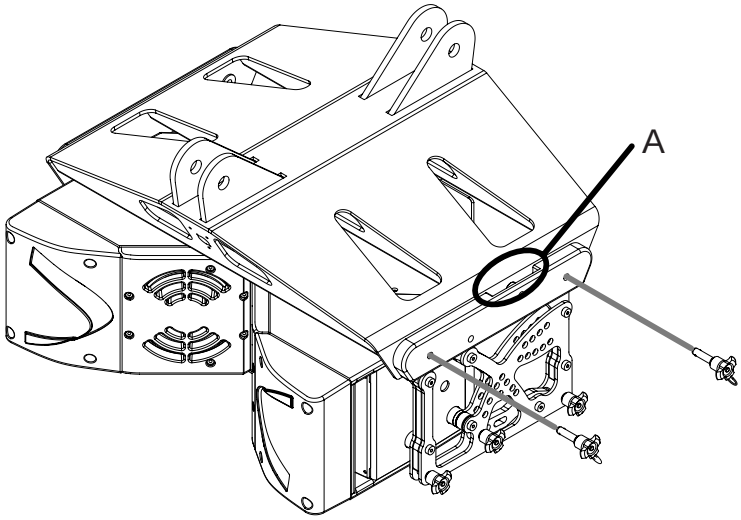
3.4.2 Bumper to fist GEO T4805 assembly

4 push-pins (BLGEOT12-35, 12mm diameter x 35 mm length) connect the top GEO T4805 to the bumper.

IMPORTANT

These 4 push-pins are slightly longer than the ones used to connect GEO T's (35mm length instead of 30mm).

Never use the GEO T 12mm x 30mm push-pins to connect the top GEO T4805 to the bumper.



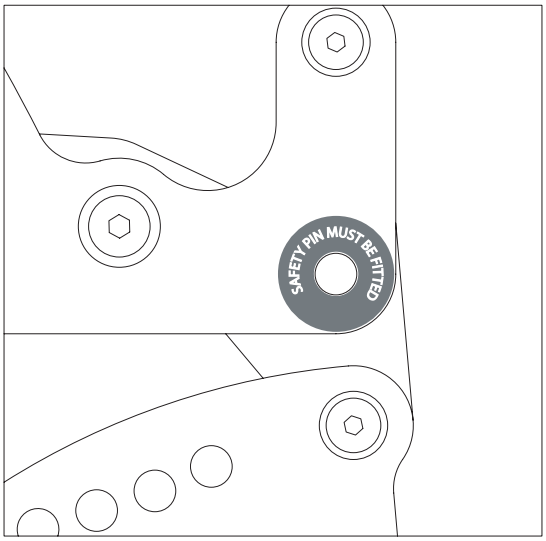
FIRST GEO T4805 TO BUMPER ASSEMBLY

- Position the bumper on the first GEO T4805 so that the bumper side slot (A) is at the rear.
- Link the GEO T4805 to the bumper using the four 12mm x 35mm push-pins provided with the bumper; depress the button at the rear of the pin to release the locking mechanism, insert the pin fully, and release the button.
- Link the GEO T4805 to the bumper using the four 12mm x 35mm push-pins provided with the bumper; check that all push-pins are in their locked position.
- Ensure that no objects have been placed accidentally on the top of the bumper as they may fall when the system is lifted.

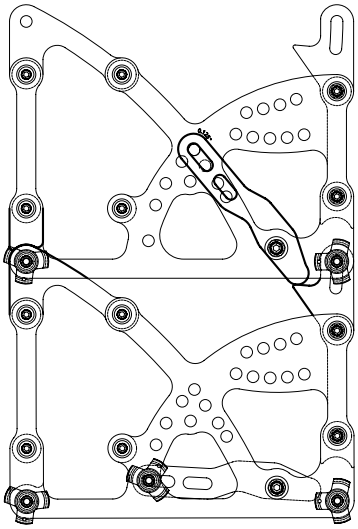
3.4.3 First to second GEOT 4805

In "Compression Mode", the linking bars must remain inside their respective cabinet side rigging plates. Angles between one cabinet and the one below are adjusted using the upper cabinet "compression mode setting" holes (see drawing below).

- Lift the bumper and top GEO T4805 assembly and position the next GEO T4805 below the assembly.
- Lower the bumper and top GEO T4805 assembly carefully until the first and second GEO T4805 side rigging plates locate. Use front flanges and side vent ports to guide the assembly. The rigging plates have been designed to locate against each other and so align the holes correctly.
- Fix the two GEO T4805 by inserting one 12mm x 30 mm push-pin in the "SAFETY PIN MUST BE FITTED" hole on each side (see figure below).



"SAFETY PIN MUST BE FITTED" HOLE

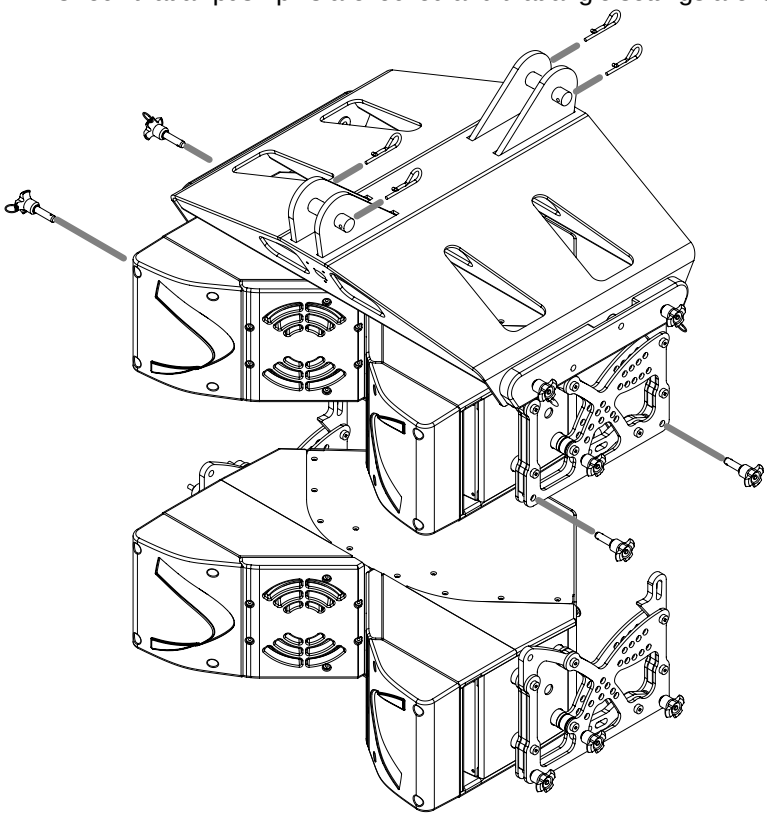


GEO T4805: RIGGING PLATES IN COMPRESSION MODE

IMPORTANT

The push-pins for "SAFETY PIN MUST BE FITTED" holes must always be inserted first.

- Insert two additional 12mm x 30mm push-pins in the front holes (see figure below).
- Lift the bumper and two first GEO T4805 to a height that allows convenient access to the linking bars and the angle setting holes.
- Release the linking bar push-pin from its storage position (typically 0.125° when stored in flight cases), rotate the linking bar within the side rigging plate and position the linking bar oblong hole in front of the required angle value hole and insert the push-pin.
- Repeat the angle setting procedure on the opposite side of the cabinet.
- Check that all push-pins are locked and that angle settings are identical on each side.



FIRST GEO T4805 TO SECOND GEO T4805 ASSEMBLY

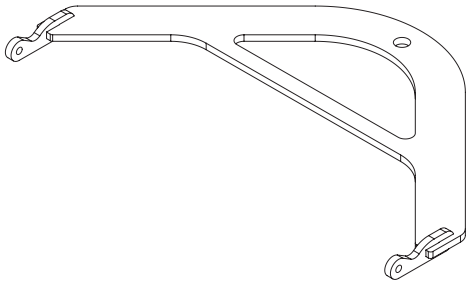
IMPORTANT

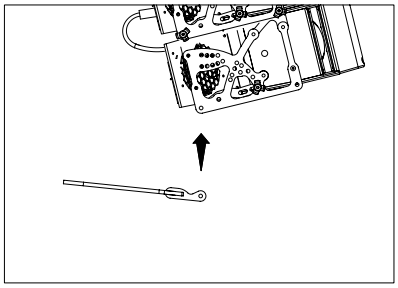
DO NOT attempt to make any changes to the linking bars whilst the system is landed or being lifted or lowered.

-

3.4.4 Subsequent GEO T4805's

- Repeat the above section steps, until six GEO T4805 are in place. As the assembly is lifted, angles between GEO T4805 cabinets will remain at 0° whatever the linking bar positions.
- NB : In "Compression Mode", the linking bars are free to be adjusted while the system is clear of the ground, provided that rear pull-up force is not applied.
- Once the GEO T4805 assembly is completed, connect the bottom bumper to the last GEO T 4805 with the 12mm x 30mm push-pins inserted in the position marked "Safety Pin Must Be Inserted" (see drawings below).



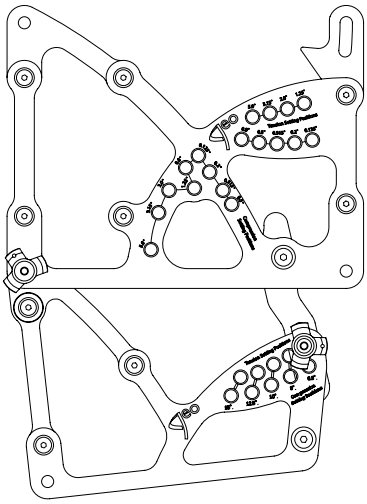


- Check the array according to the Checklist procedure described later in this manual.

3.4.5 Last GEO T4805 to first GEO T2815

IMPORTANT

Unlike GEO T 4805, GEO T2815 does not have the 0° safety position.



"Compression Mode" only applies to GEO T4805. GEO T2815's must always be installed in "Tension Mode".

- Follow the instructions given in section 3.3.4 for fitting GEO T2815 cabinets in tension mode.
- Check that all push-pins are locked and that angle settings are identical on each side.

3.4.6 First to second GEO T2815

In "tension mode" position, the upper oblong hole and the upper hole series is used for 6.3°, 8.00°, 10.0°, 12.5° and 15° angle settings.

- Repeat the above section steps, until you have positioned the required number of GEO T2815 cabinets.
- Connect the speaker links.
- Check the array according to the Checklist procedure.

3.4.7 Applying compression

- With the cluster raised 1 meter (~3feet) off the ground, lower the rear motor hoist only. The array will swing slowly forwards until the centre of gravity lies directly below the front motor hoist. Continue to lower the rear motor hoist and the rear articulated part of the Kelping Beam will swing downwards towards the cabinets. Stop the hoist when the rear arm of the Kelping Beam reaches an elevation of approximately –70 degrees. The angle is approximate and is not critical to the final angle of the array.

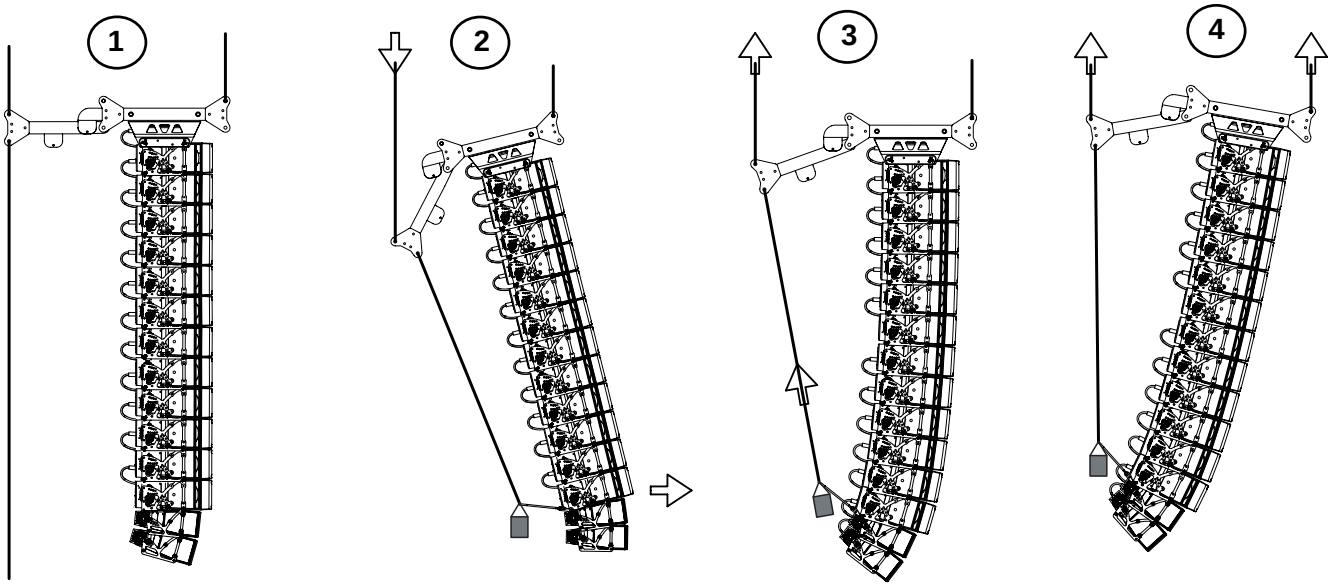
IMPORTANT

When lowering rear motor hoist, the cluster swings forward: ensure there is no obstacle in front of the cluster within sufficient distance

- Attach the lower hook of the Kelping Chain Link to the rear of the Bottom Bumper using a 3/4 Shackle.
- Manually raise the Bottom Bumper until it is approximately parallel with the ground and set the adjustable clutch in the Kelping Chain Link so that the chain is taught.
- Make a final check that the Kelping Link Chain is correctly installed and store the surplus chain in the chain bag supplied. The chain bag should be clipped to the clutch adjuster assembly.
- The rear motor hoist may now be raised to apply the pull-up force to the bottom of the array. Notice that, as the rear hoist is raised, the cabinets in the array close together to the angles set by the linking bar adjustments.
- When all of the cabinets are closed together the array begins to move as a whole. This is the indication that the angles have been correctly set. Ensure that the rear arm and the main member of the Kelping Beam remain at an angle of ~20° with respect to each other, indicating that the pull-up force will remain constantly applied.

IMPORTANT

DO NOT attempt to make any changes to the linking bars when the rear pull-up force is applied.

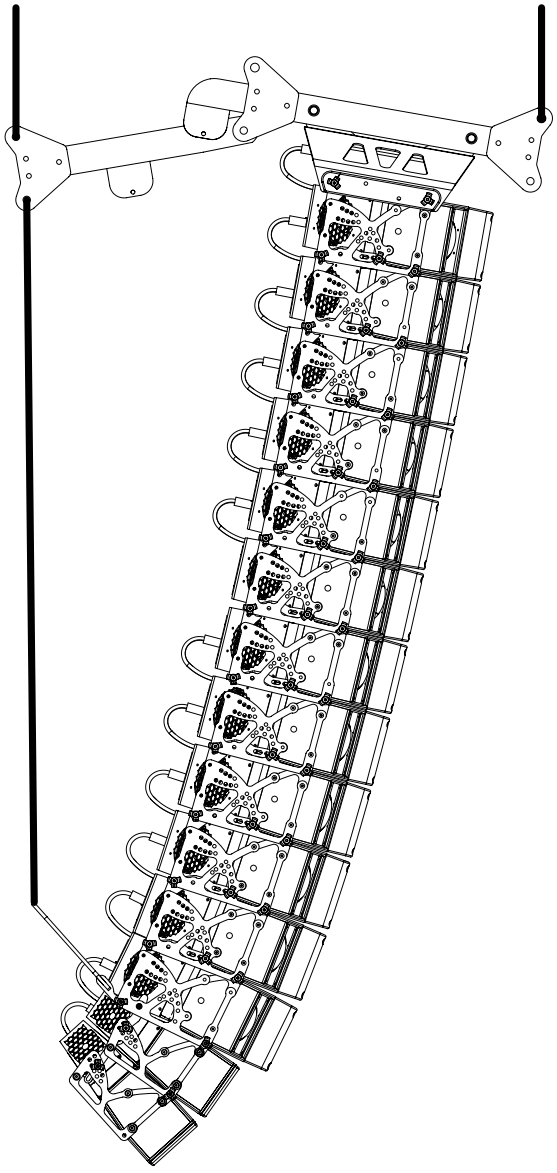


3.4.8 Positioning the cluster

- Adjust the overall height and aiming angle of the array by adjusting the front and rear motor hoists accordingly. Note that the accuracy of the angle and height of the array are critical and the appropriate measurement tools are necessary to achieve this (see the appendix for a recommended list of installation tools).
- Install a secondary safety steel between the Kelping Beam and a suitable point in the supporting structure.

IMPORTANT

The requirements for secondary safety systems vary with territories. However, the secondary safety steel MUST have a SWL equivalent to or greater than that of the rigging system.



10 GEO T 4805 + 2 GEO T 2815 set in compression mode

3.4.9 De-rigging and loading out

Taking the system down is just a case of doing the reverse procedure to flying the array. However, there are some important factors to consider.

- Lower the array running the two motor hoists simultaneously until the bottom cabinet is just off the floor.
- Run the rear motor hoist down until there is no tension on the GEO T kelping chain and no compression on the system.
- Disconnect the GEO T kelping chain from the GEO T bottom bumper and remove the bottom bumper from the array. (You may have to remove the T2815's first)
- Run the rear motor hoist back up until the GEO T kelping beam is level and the array hangs vertically.
- Link cables must be disconnected and stowed away in the recesses in the rear of each cabinet.
- NB : As the system is lowered it is good practise to disconnect as many loudspeaker cables as can be reached without climbing the array. This ensures that

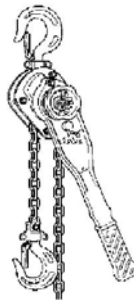
a cable should not be accidentally forgotten when the system is separated. Damage to the connector will occur should this mistake be made.

- In each group of 3 GEO T4805's, the linking bar of the lowest GEO T4805 should be returned to the 5° position in order to sit flat in the flight case.
- All other GEO T4805's should have their linking bars returned to 0.125° position to ensure that the cabinets stay vertical when landing.
- Position the flight case underneath the array and carefully lower the array into the flight case, taking care not to catch any parts in the case.
- NB: When lowering the system into the flight case, alignment is easier if two operators lift the flight case onto the bottom of the system as it is lowered. This ensures that the lowest cabinet does not hit the flight case extrusion if the case is mis-aligned.
- Remove front and rear push pins from the two last cabinets, and carefully lift the array using both motor hoists until the array is clear. Ensure the array is vertical at all times.
- Repeat the procedure for all cabinets.
- Remove the GEO T kelping chain from the GEO T Kelping Beam, the GEO T kelping beam and the GEO T bumper. Remember to replace all the pins back in their respective beams.
- Fold the kelping beam and pin it into the closed position for transit.

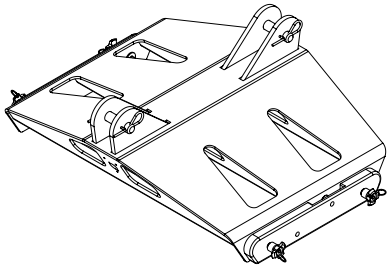
3.5 "Compression Mode – Half Kelping Beam" Setup

"Compression mode – Half Kelping Beam" requires the following accessories:

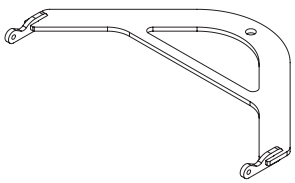
- GEO T Main Bumper (GEOT-BUMPER)
- GEO T Kelping Beam, Front Beam Only (GEOT-KELPBEAM)
- GEO T Bottom Bumper (GEOT-BTBUMPER)
- GEO Chain Lever Hoist 1.5 tonne – 9m chain (LEVA1500)



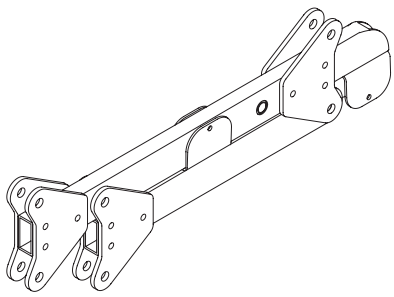
CHAIN LEVER HOIST 1.5 TONNE



GEO T MAIN BUMPER



GEO T BOTTOM BUMPER



GEO T FOLDED KELPING BEAM

To be lifted in “Compression mode – Half Kelping Beam”, the GEO T bumper requires either:

- one motor hoist and a bridle;
- or two motor hoists (easier initial angle setting);

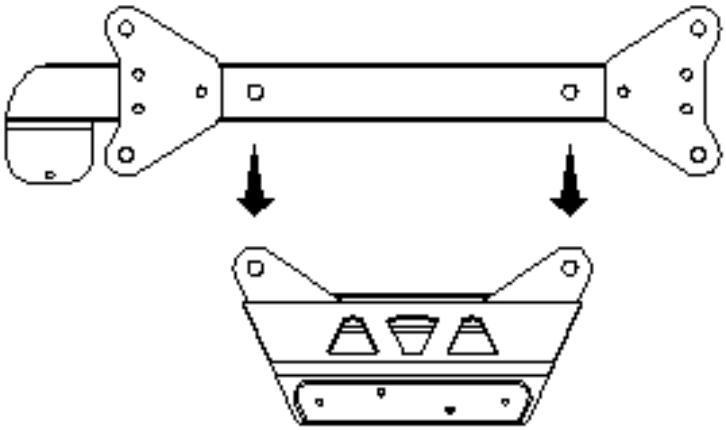
In both cases, ensure that the motors are properly rated.

IMPORTANT

Motor hoists must be rated to support the entire cluster weight.
For arrays of 6 to 18 cabinets, 1 tonne motor hoists are sufficient.
Arrays of 18 cabinets and above should be supported with 2-tons capacity motor hoists.

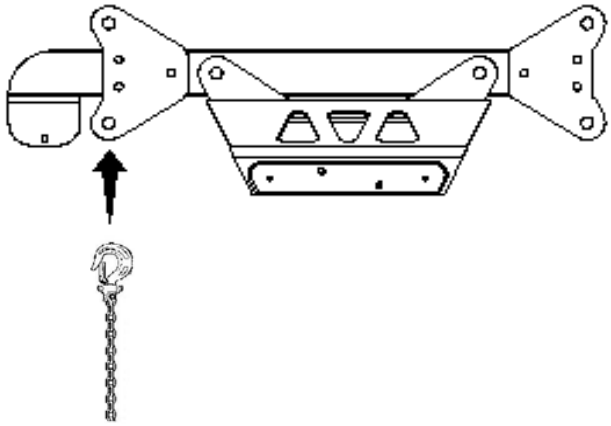
3.5.1 Front Kelping beam to bumper

- Disconnect Rear Beam from Front Beam by removing connecting axis. Store Rear Beam.
- Link the motor hoists to the Kelping Beam using front and rear upper axis (fixed beam), and ensure that these axes are properly locked with the “R” clips supplied.
- Lift the Kelping Beam and position the bumper below it.
- Lower the Kelping beam so that the front beam load pin holes are aligned with the bumper load pin holes (see drawing).



KELPING BEAM TO BUMPER SETUP

- Connect the Kelping Beam to the bumper with the two axes through the corresponding holes (see drawing above) and ensure that these are properly locked with the “R” clips.
- Attach theChain Lever Hoist LEVA1500 chain hook to the Kelping Beam rear lower axis see drawing below).
- NB : the Chain Lever Hoist LEVA1500 connects to the bottom GEO T4805, and a small bag is provided for excess chain.



ATTACHING THE LEVA1500 CHAIN TO THE KELPING BEAM

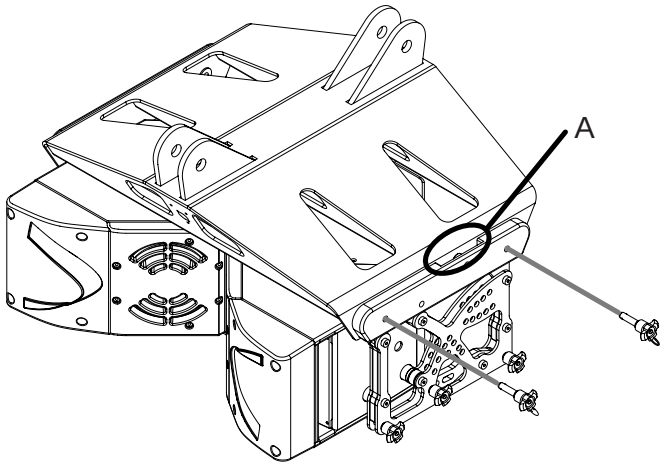
3.5.2 Bumper to fist GEO T4805 assembly

4 push-pins (BLGEOT12-35, 12mm diameter x 35 mm length) connect the top GEO T4805 to the bumper.

IMPORTANT

These 4 push-pins are slightly longer than the ones used to connect GEO T's (35mm length instead of 30mm).

Never use the GEO T 12mm x 30mm push-pins to connect the top GEO T4805 to the bumper.



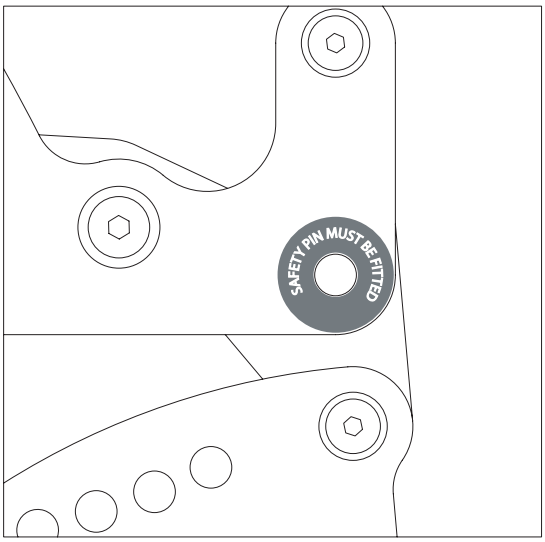
FIRST GEO T4805 TO BUMPER ASSEMBLY

- Position the bumper on the first GEO T4805 so that the bumper side slot (A) is at the rear.
- Link the GEO T4805 to the bumper using the four 12mm x 35mm push-pins provided with the bumper; depress the button at the rear of the pin to release the locking mechanism, insert the pin fully, and release the button.
- Link the GEO T4805 to the bumper using the four 12mm x 35mm push-pins provided with the bumper; check that all push-pins are in their locked position.
- Ensure that no objects have been placed accidentally on the top of the bumper as they may fall when the system is lifted.

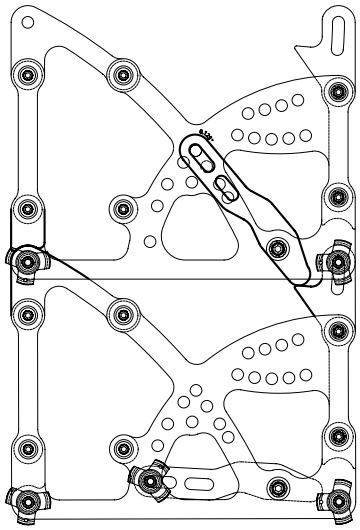
3.5.3 First to second GEOT 4805

In “Compression Mode”, the linking bars must remain inside their respective cabinet side rigging plates. Angles between one cabinet and the one below are adjusted using the upper cabinet “compression mode setting” holes (see drawing below).

- Lift the bumper and top GEO T4805 assembly and position the next GEO T4805 below the assembly.
- Lower the bumper and top GEO T4805 assembly carefully until the first and second GEO T4805 side rigging plates locate. Use front flanges and side vent ports to guide the assembly. The rigging plates have been designed to locate against each other and so align the holes correctly.
- Fix the two GEO T4805 by inserting one 12mm x 30 mm push-pin in the “SAFETY PIN MUST BE FITTED” hole on each side (see figure below).



“SAFETY PIN MUST BE FITTED“ HOLE

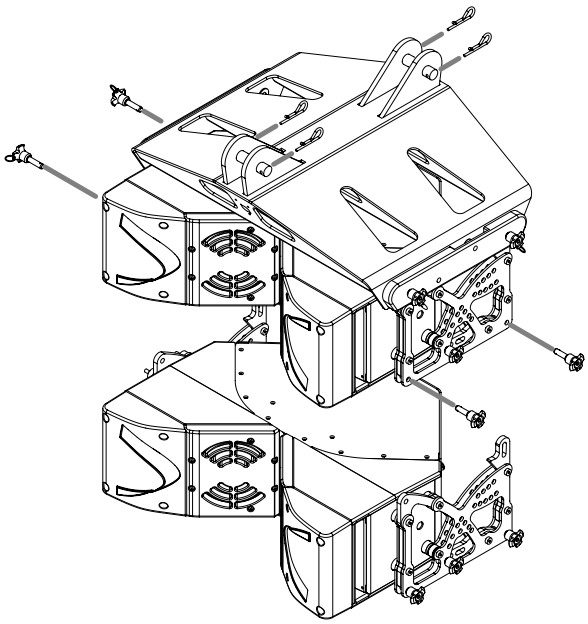


GEO T4805: RIGGING PLATES IN COMPRESSION MODE

IMPORTANT

The push-pins for “SAFETY PIN MUST BE FITTED” holes must always be inserted first.

- Insert two additional 12mm x 30mm push-pins in the front holes (see figure below).
- Lift the bumper and two first GEO T4805 to a height that allows convenient access to the linking bars and the angle setting holes.
- Release the linking bar push-pin from its storage position (typically 0.125° when stored in flight cases), rotate the linking bar within the side rigging plate and position the linking bar oblong hole in front of the required angle value hole and insert the push-pin.
- Repeat the angle setting procedure on the opposite side of the cabinet.
- Check that all push-pins are locked and that angle settings are identical on each side.



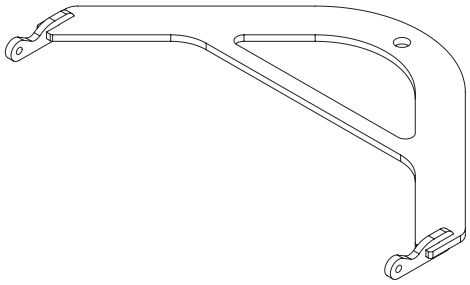
FIRST GEO T4805 TO SECOND GEO T4805 ASSEMBLY

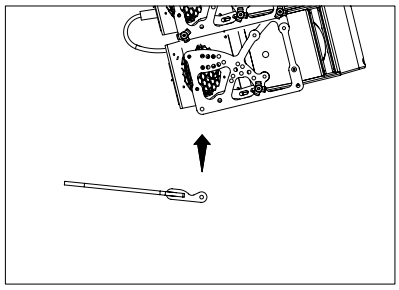
IMPORTANT

DO NOT attempt to make any changes to the linking bars whilst the system is landed or being lifted or lowered.

3.5.4 Subsequent GEO T4805's

- Repeat the above section steps, until six GEO T4805 are in place. As the assembly is lifted, angles between GEO T4805 cabinets will remain at 0° whatever the linking bar positions.
- NB : In "Compression Mode", the linking bars are free to be adjusted while the system is clear of the ground, provided that rear pull-up force is not applied.
- Once the GEO T4805 assembly is completed, connect the bottom bumper to the last GEO T 4805 with the 12mm x 30mm push-pins inserted in the position marked "Safety Pin Must Be Inserted" (see drawings below).





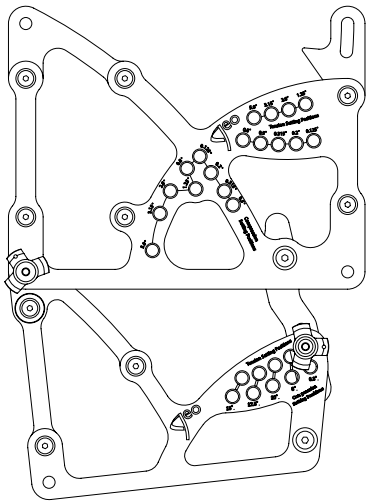
- Check the array according to the Checklist procedure described later in this manual.

3.5.5 Last GEO T4805 to first GEO T2815

IMPORTANT

Unlike GEO T 4805, GEO T2815 does not have the 0° safety position.

"Compression Mode" only applies to GEO T4805. GEO T2815's must always be installed in "Tension Mode".



- Follow the instructions given in section 3.3.4 for fitting GEO T2815 cabinets in tension mode.
- Check that all push-pins are locked and that angle settings are identical on each side.

3.5.6 First to second GEO T2815

In "tension mode" position, the upper oblong hole and the upper hole series is used for 6.3°, 8.00°, 10.0°, 12.5° and 15° angle settings.

- Repeat the above section steps, until you have positioned the required number of GEO T2815 cabinets.
- Connect the speaker links.
- Check the array according to the Checklist procedure.

3.5.7 Applying compression

- Raise the cluster 1 meter (~3feet) off the ground keeping bumper horizontal;
- Manually raise the Bottom Bumper and connect the Chain Lever Hoist hook to the rear of the Bottom Bumper using a ¾ Shackle.

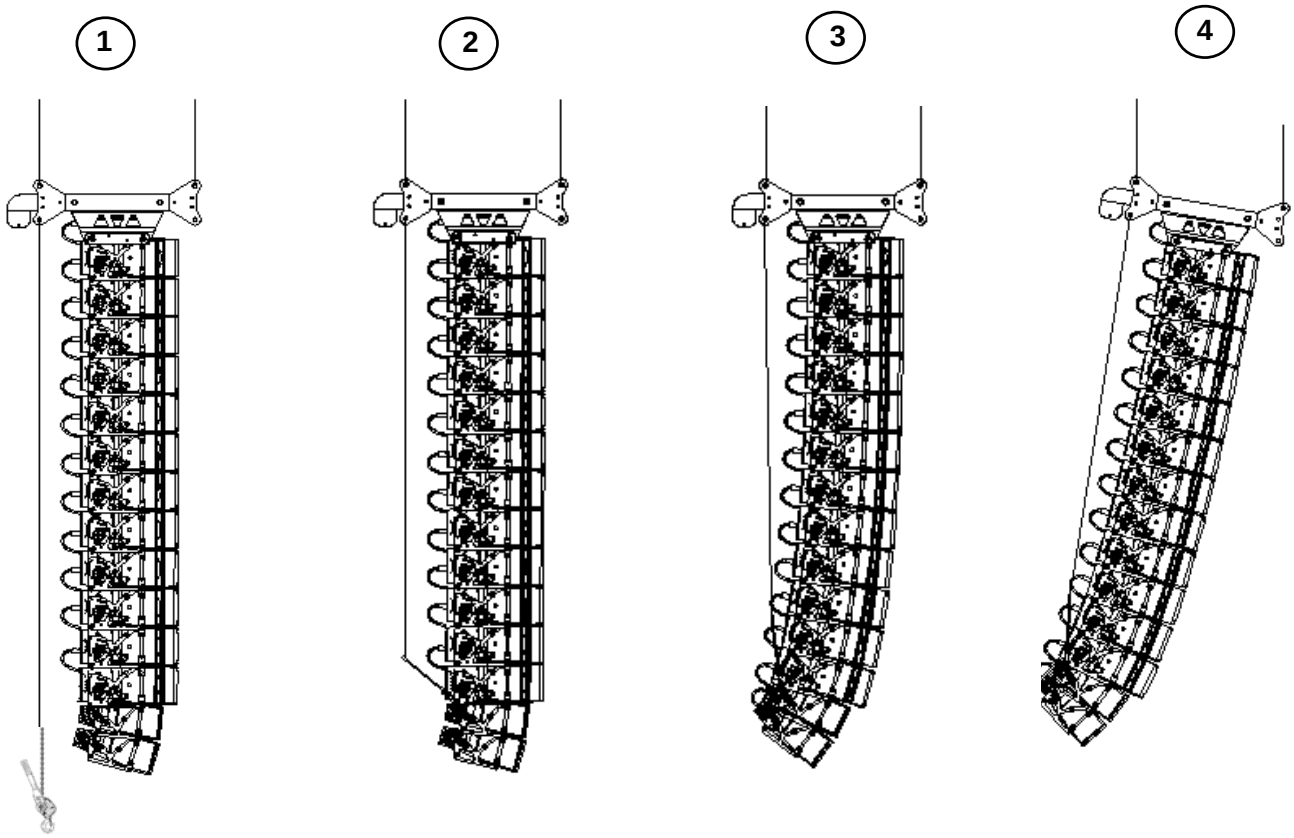
- Rotate the fingerwheel clockwise until the chain is taught.
- Make a final check that the LEVA1500 chain is correctly installed and store the surplus chain in the chain bag supplied. The chain bag should be clipped to the Chain Lever Hoist.
- Unse the LEVA1500 lever to apply the pull-up force to the bottom of the array. Notice that, as the LEVA1500 chain gets shorter, the cabinets in the array close together to the angles set by the linking bar adjustments.
- When all of the cabinets are closed together, required force to rotate LEVA1500 lever becomes much stronger. This is the indication that the angles have been correctly set.

IMPORTANT

DO NOT attempt to force on LEVA1500 lever once you feel it resisting strongly to rotation; you might damage GEOT flying system by doing so

IMPORTANT

DO NOT attempt to make any changes to the linking bars when the rear pull-up force is applied.



3.5.8 Positioning the cluster

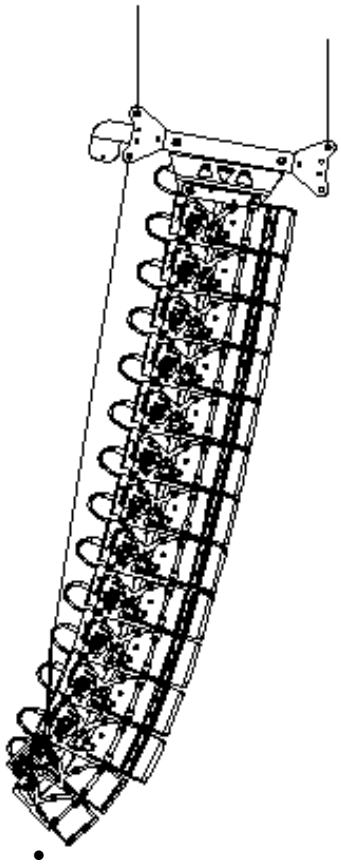
- If one motor hoist only is used, the bridle chain length must be adjusted for the correct bumper angle prior to cluster lift.
- Lift the GEO T array to the height determined in GeoSoft (GeoSoft array height definition is for the top surface of the topmost cabinet).
- Adjust the bumper angle as determined in GeoSoft by lowering or lifting rear motor hoist (so that the front height does not change).
- Check all GEO T angles with an inclinometer (cumulative error should always be lower than 0.5°).
- Once the bumper is in definitive position a secondary safety steel must be fitted (this secondary safety steel should link the bumper to a suitable point in the supporting structure)

IMPORTANT

The requirements for secondary safety systems vary with territories. However, the secondary safety steel MUST have a SWL equivalent to or greater than that of the rigging system.

3.5.9 De-rigging and loading out

Taking the system down is just a case of doing the reverse procedure to flying the array. However, there are some important factors to consider.



10 GEO T 4805 + 2 GEO T 2815 SET IN COMPRESSION MODE

- Lower the array until the bottom cabinet is just off the floor and the bumper is back to horizontal.
- Rotate the LEVA1500 lever counterclockwise until there is no tension on the GEO T kelping chain and no compression on the system.
- Disconnect the LEVA1500 hook from the GEO T bottom bumper and remove the bottom bumper from the array. (You may have to remove the T2815's first)
- The array now hangs vertically.
- Link cables must be disconnected and stowed away in the recesses in the rear of each cabinet.
- NB : As the system is lowered it is good practise to disconnect as many loudspeaker cables as can be reached without climbing the array. This ensures that a cable should not be accidentally forgotten when the system is separated. Damage to the connector will occur should this mistake be made.
- In each group of 3 GEO T4805's, the linking bar of the lowest GEO T4805 should be returned to the 5° position in order to sit flat in the flight case.

- All other GEO T4805's should have their linking bars returned to 0.125° position to ensure that the cabinets stay vertical when landing.
- Position the flight case underneath the array and carefully lower the array into the flight case, taking care not to catch any parts in the case.
- NB: When lowering the system into the flight case, alignment is easier if two operators lift the flight case onto the bottom of the system as it is lowered. This ensures that the lowest cabinet does not hit the flight case extrusion if the case is mis-aligned.
- Remove front and rear push pins from the two last cabinets, and carefully lift the array using both motor hoists until the array is clear. Ensure the array is vertical at all times.
- Repeat the procedure for all cabinets.
- Remove the LEVA1500 chain hook from the GEO T font Kelping Beam, the GEO T kelping beam and the GEO T bumper. Remember to replace all the pins back in their respective beams.
- Reassemble front and rear kelping beams, and pin them into the closed position for transit.

3.6 Testing and Maintenance of the system

- General: Geo is a precision piece of equipment and requires regular attention to maintenance in order to give long and reliable service. NEXO recommends regular testing of loudspeaker rigging components, preferably using a suitable test rig coupled with a visual inspection.
- Fasteners: there are several critical points in the Geo T cabinets.

  Of primary concern are:

  a) The machine screws attaching the rigging system to the cabinet.

  b) The screws attaching the rear aluminium section to the cabinet.

  c) The screws attaching the directivity flanges to the front of the cabinet.

  These fasteners should be regularly checked and tightened as necessary.
- Cleaning: The exterior of the cabinet and the rigging system can be cleaned with a damp cloth soaked in mild soapy water. On no account use solvent based cleaners , which may damage the finish of the cabinet

After cleaning, the rigging system must be treated with a suitable lubricant to prevent rusting. NEXO recommends the use of Scottoil FS365 which is a water-based lubricant with a mixture of machine oil, surfactant and anti-rust treatment.

4 NEXO NX242 DIGITAL CONTROLLER FOR GEO T

4.1 NX242 Proprietary Functions

The NX242 is much more than a “generic” Digital Signal Processor. It provides all the standard functions that you expect from this type of unit, but its real value is the interface between you and your speaker system. The NX242 includes a number of proprietary functions, developed and refined during NEXO’s 20 years of loudspeaker development experience, to ensure that your PA delivers maximum performance and reliability.

4.1.1 Upgradable Firmware

NEXO releases regular firmware updates. Each new release is the result of our ongoing R&D program combined with user feedback from the field. New firmware releases can include new setups for different combinations of NEXO full range loudspeakers and subwoofers, improvements to existing setups, and new software functions. The NX242 is thus evolving with each of those releases, profiting from the latest discoveries of NEXO’s R&D department as well as the experience of NEXO users.

4.1.2 EQ & Filtering

Subsonic and VHF filtering

Low and high-pass filters are used to filter out frequencies that could possibly degrade the performance of the TDcontroller and amplifiers. The filters are optimised to work in conjunction with overall system response.

The high pass filters are also extremely important as they help control excursion at very low frequencies, which is a major feature for system reliability. This is one of the main reasons to avoid using setups which are not designed for the cabinet you are using.

Equalising acoustical response

NEXO loudspeakers are acoustically designed for maximum efficiency over their operating bandwidth. The NX242 provides the correction required to obtain a flat system response. Active rather than passive attenuation allows the lowering of amplifier voltages for a given output SPL and therefore increases the maximum SPL achievable with the same amplifier. Active equalisation can also extend a NEXO loudspeaker’s frequency response, especially at low frequencies where acoustical performance is limited by cabinet size.

While many DSP processors can provide this type of EQ, none can include the extensive measurement facilities and listening tests employed by NEXO R&D when adjusting NX242 setups for a particular loudspeaker.

Crossover section

Crossover between different bands is tuned for every set-up of every cabinet. The crossover is designed to ensure the best phase alignment possible throughout the crossover overlap region.

Each crossover is “made to measure” in order that each transducer can fit with its neighbour by achieving a perfect phase alignment. Unconventional filters are used, ranging from 6dB/octave to near infinite slopes depending of the type of crossover wanted. Time alignment is also performed in an unconventional way, by using the crossover filter group delays in combination with allpass and/or frequency dependent delays.

4.1.3 Protection

VCAs and VCEQs

Each channel has its own simulation and protection process.

Each audio channel contains a combination of controlled gain stages (let's call them VCAs as in analogue circuitry). These VCAs are embedded into complex composite signal chains that adapt change their basic operation into frequency selective attenuation, similar to an analog voltage controlled dynamic equaliser (VCEQ).

Each VCEQ and VCA is controlled via synthesis of several signals from the various detection sections. That synthesis is in fact the envelope of those signals, with an optimised release and attack time for each VCEQ and VCA (depending on its frequency range and the cabinet selected).

Displacement Control

The Sense input signal is sent to a shaping filter producing a signal whose instantaneous amplitude is proportional to the voice coil excursion. This signal, after rectification, is compared to a preset threshold matching the maximum usable value, as determined from laboratory measurements. Any part of the signal exceeding the threshold is sent to the VCEQ control buffer while the VCEQ acts as an instantaneous (very short attack time) limiter to prevent displacement from exceeding the maximum permissible value.

Temperature Control

Each sense signal is fed into a shaping filter (one per transducer), each one producing a signal proportional to the instantaneous current flowing into the voice coil of the transducer. After rectification, this signal is integrated with attack and release time constants equivalent to the thermal time constants of the voice coil and chassis, producing a voltage, which is representative of the instantaneous temperature of the voice coil.

When this voltage reaches the threshold value corresponding to the driver's maximum safe operating temperature, the VCA becomes active to reduce the NX242's output signal level until the effective temperature falls below the maximum usable value.

In order to avoid detrimental effects induced by very long release time constants produced by the temperature detection signal (system output being reduced for an extended period, "pumping" effects, etc.), the detection signal is modulated by another voltage integrated with faster time constants that match the subjective perception of sound level. This allows the controller to reduce the effective operating duration of the temperature limiter and make it sound more natural, while the efficiency of protection is fully preserved and protection thresholds are kept as high as possible.

Physiologic Dynamic Control

The Physiologic Dynamic Control is intended to avoid unwanted effects produced by long attack time constants. By anticipating the operation of the temperature limiter, it prevents a high level audio signal appearing suddenly, then being kept up for long enough to trigger the temperature limiter. Without this, a rough and delayed gain variation would result that would be quite noticeable and unnatural.

The Physio control voltage acts independently on the VCA with its operation threshold slightly (3 dB) above that of the temperature limiter and a low compression ratio; its optimised attack time constant allows it to start operating without any subjectively unpleasant transient effects.

Peak Limiter

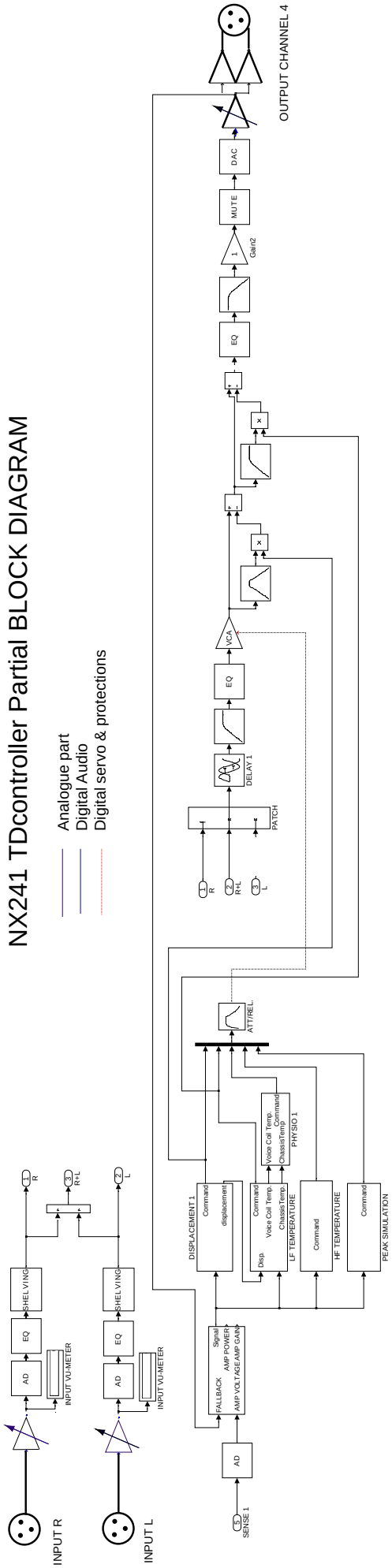
The peak limiter primary function is to avoid massive clipping of the amplifier, which can have some very audible artefacts and in some cases may be damaging to the loudspeakers. Modulation of the amplifier's supply voltage rails can create very low frequencies or high-frequency, high level harmonics. Since these occur after the NX242 in the signal path, they are not filtered by the TDcontroller circuitry.

The threshold of the peak limiter is set by the user to match the amplifier's clipping point.

The second function of the peak limiter is to avoid huge amounts of power being sent to a driver. Each driver is protected against overheating and overexcursion, but there could be other failure modes that cannot be predicted by simulation (especially mechanical damage to the cone). Each driver is specified for a certain power handling and a factory set peak limiter threshold is tuned to avoid any abuse.

4.2 Cardioid LF and VLF

Cardioid LF and VLF is one of the key advances of the GEO T/CD18 system. This feature is only achievable with a total control of the DSP chain. Although the basic concept as presented in audio text books is relatively simple, producing a cardioid pattern from a loudspeaker without a major loss of efficiency requires advanced DSP processing.



Other “loudspeaker management” DSP devices do not provide the algorithms that the NX242 uses to optimise the cardioid operation of the GEO T4805, CD18 and CD12.

GEO T4805 LF and CD18 dispersion are digitally set to a cardioid pattern by adjusting the front and rear 8” loudspeakers phase and amplitude relationship. Maximum attenuation is achieved at 180°; average rear to front attenuation is more than 12 dB.

GEO T2815 low frequency directional behaviour is achieved by using rear radiating acoustic resistor. These are designed so that LF dispersion is cardioid. Maximum attenuation is achieved at 180°, average rear to front attenuation is more than 12 dB.

4.3 GEO T NX242 Setups description

4.3.1 GEO T4805

Hardware configuration

- Input can be selected in the MENU 3.2 (L, R or L+R)
- Output 1 drives the rear-firing LF 8 inch long excursion neodymium cone transducers
- Output 2 drives the front-firing LF/MF 8 inch long excursion neodymium cone transducers
- Output 3 drives the HF 3-inch voice coil, 1.4 inch exit neodymium compression driver
- Output 4 is not used.

Setups

Please refer to the latest version of the NX242 user manual and firmware (www.NEXO-sa.com).

4.3.2 GEO T2815

Hardware configuration

- Input can be selected in the MENU 3.2 (L, R or L+R)
- Output 1 is not used
- Output 2 drives the LF/MF 8 inch long excursion neodymium cone transducers
- Output 3 drives the HF 3-inch voice coil, 1.4 inch exit neodymium compression driver
- Output 4 is not used.

4.3.3 CD18

Hardware configuration

- Input (L, R or L+R) can be selected in MENU 3.2
- Output 1 drives the rear-firing 18 inch transducer of the left CD18's
- Output 2 drives the front-firing 18 inch transducer of the left CD18's
- Output 3 drives the rear-firing 18 inch transducer of the right CD18 's
- Output 4 drives the front-firing 18 inch transducer of the right CD18 's

Setups

Please refer to the latest versions of the NX242 user manual and firmware (www.NEXO-sa.com).

4.4 Trouble shooting

The NX242 has been designed to be user-friendly. However with highly technical systems such as the GEO T & CD18, incorrect adjustment of the NX242 can lower the quality & safety of your system. Listed below are the most common errors encountered by NEXO Technical Support.

4.4.1 Operation of Multiple TDcontrollers

Typically, GEO T/CD18 systems require a minimum of two NX242's per side (one NX242 for GEO T's, another for the CD18's). Eventually, two or more NX242's will operate within the same GEO T cluster. It is mandatory to verify the consistency of the setups and adjustment between processors to avoid the problems described below.

IMPORTANT

When using multiple NX242's in a single array, all parameters should be identical and set to proper values.

4.4.2 Amplifier Power (MENU 2.7)

If the amplifier power (MENU 2.7) is set to a value below the amplifer's actual power, the peak limiter of the NX242 will trigger continually, creating audible distortion. Please note that this peak limiter is not set to act as a compressor on the signal. It is intended to minimize the clipping of the amplifier by operating slightly after the amplifier's clipping point.

One way to properly adjust this parameter is to set amplifier power at maximum (5000W) and decrease the value until the amplifier and TDcontroller clip at the same time.

4.4.3 Amplifier Gain (MENU 2.6)

It is very important to check the gain of each channel. When all amplifier gain switches are set to identical gain and LF rear and LF/MF front amplifier operate in bridge mono mode, you must remember to add 6dB to the normal gain on the channels connected to mono bridged amplifiers. If this value is not set properly the TDcontroller will not be able to protect your system properly. The second line of the MENU2.6 displays the gain as seen by the NX242 to ease the setting of this parameter.

4.4.4 Gains

If your amplifier gains are not the same on each channel, you will have to adjust the inter-channel gain in order to compensate for this amplifier gain difference.

4.4.5 Delays

Multiple NX242's can be used on a single GEO T array. When changing the delay in one NX242 TDcontroller that is part of a multi-controller system, take great care to have exactly the same delay setting in all NX242 TDcontrollers that receive the same input signal (i.e. all NX242's that are fed from the Left output of the mixing console should have the same delay settings). A Tangent Array is very sensitive to delay differences between sections of the array in the same line. You could experience coverage problems if all delays applied to a Tangent Array are not equal.

Please refer to the chapter in the NX242 User Manual on setting delay for proper time alignment between GEO T Series and CD18.

4.4.6 Reversed Cardioid Pattern

Polarity checks are often performed while the system is being set up. Keep in mind that cardioid speakers may also require a coverage test. If you invert two outputs of the NX242, you could have the main lobe inverted and firing to the rear. It may be quite hard to detect a reversed cardioid pattern when it involves one section of a large array.

A good practice is to test the each cabinet in the array with the front speakers only. The system is then omni-directional. Then turn on the back speaker: you should notice a massive reduction at the back, and additional level at the front.

This test must be done in addition to the usual polarity test.

4.4.7 Using the wrong NX242 setups for a given cabinet

Each NX242 setup is tailored for a certain NEXO loudspeaker. Using the wrong setup will create safety and quality problems. Always check that every cabinet in your system is being driven by the correct NX242 setup.

4.4.8 Connections

To ensure correct electronic behaviour, and to guarantee specifications and EMC performance, a NX242 must be properly wired. Always use balanced connectors with the shield connected to pin 1 on both sides. For more wiring recommendations please refer to the application note in the NX242 manual update.

4.5 Delays & System alignment

4.5.1 Description

The NX242's factory delay presets are optimised to provide the best possible crossover between the GEO T and CD18 systems. The reference point for this adjustment is the front of each cabinet**.** (This means that the internal delays needed to achieve a correct time alignment are set for cabinets standing next to each other with both fronts aligned). We recommend that the system is adjusted so that arrivals from GEOT array and CD18 sub-bass speakers are coincident at a fairly distant listening position.

In the examples below, r_1 being the distance from GEO T array to listener position, and r_2 being the distance from CD18 to listener position, the distance difference is then $r_1 – r_2$ (specified meters or feet).

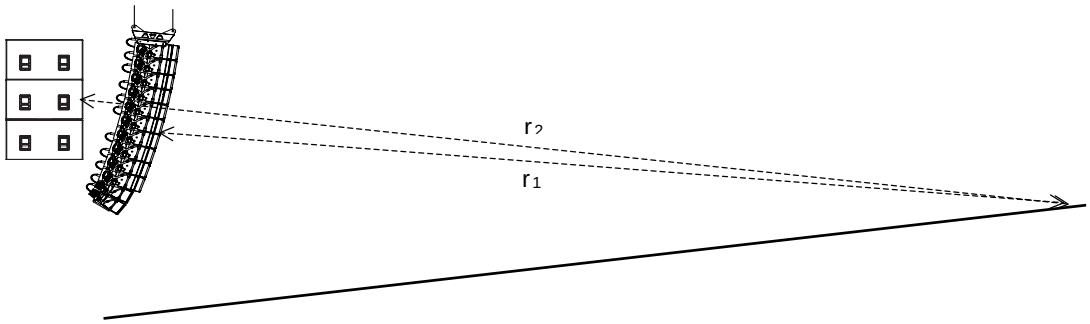
- $r_1 > r_2$, the delay should be set on the CD18 NX242 TDcontroller.
- $r_1 < r_2$, the delay should be set on the GEO T NX242 TDcontroller
- To convert the result in time delay (specified in seconds), apply:
- $\Delta t = (r_1 - r_2)/C$ r_1 and r_2 in meters, C (sound speed) ≈ 343 m/S.

The delay parameter is set in MENU 1.2 (set the units to meters, feet or seconds according to your preference).

4.5.2 Examples:

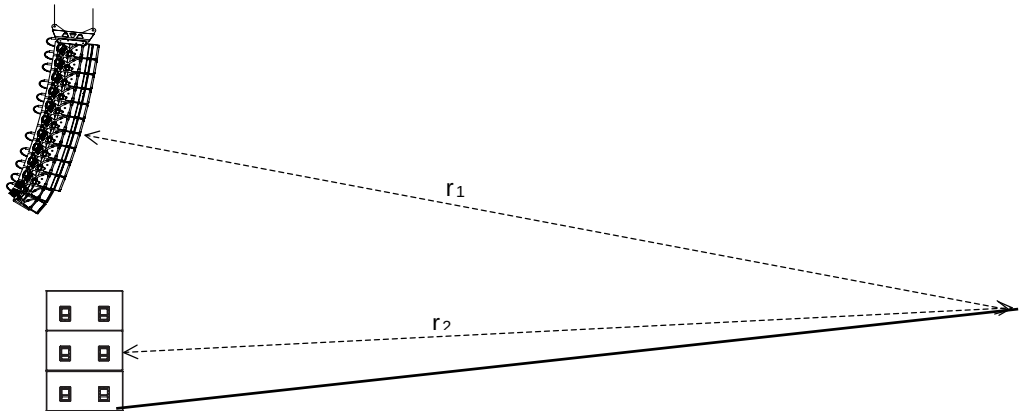
Flown CD18s

If the CD18s are flown behind a GEO T Array, delay will have to be adjusted on the GEO T NX242 TDcontrollers according to distance difference $r_2 – r_1$. (see figure below).



Stacked CD18s

If the CD18s are stacked on the ground, delay will have to be adjusted on the CD18 NX242 TDcontrollers according to the distance difference $r_1 - r_2$ (see figure below).



4.6 Driving the CD18s from the AUX send

It is quite common to use the AUX send of a mixing desk to drive the Sub section of a PA system. This gives the mixing engineer more flexibility to set the level of the subbass relative to the main PA, apply special effects, or to use a different EQ on the Sub. However, it also raises some serious issues for the performance & safety of the system (mostly time alignment).

4.6.1 What is the phase relation between the AUX and MAIN output of your mixing desk?

At NEXO, when we align systems, we take great care to have an optimum phase alignment from one octave above to one octave below the crossover frequency point. By doing so, we ensure that both drivers are working perfectly together and providing the best efficiency possible. It is then up to the user to adjust the delay on the NX242 to match the physical path difference of the different systems. It is thus possible to get a well adjusted system, even without measuring instruments.

If you choose to drive the Sub from the AUX, you feed the NX242 with two signals coming from different sources. If those two sources (MAIN output & AUX send) are not exactly in phase, you are introducing a delay – without knowing it – into the crossover between your GEO T array and your CD18 subs. Without the proper measurement tools, you will never be able to tune the system as it should be.

4.6.2 Why it is unlikely the AUX and MAIN have the same phase?

- Signal paths are likely to be different; any filter modifying the bandwidth and EQ of the signal is also affecting the phase.

  Example: a 24dB/oct high pass filter set at 15Hz is affecting amplitude of the signal by only 0.6dB at 30Hz, but the phase shift is 90°!! At 100Hz we can still measure 25° of phase shift.

- Should you want to restrict the bandwidth with a low pass filter, you can introduce a phase difference of up to 180° (completely out of phase) at the cross over point.
- If the signal is passing though any digital equipment you are adding between 1.4ms and 2.2ms (around 70° phase shift at 100Hz) due solely to the converter delay! The additional delay due to the processing itself (look ahead compressor, delay…) can be quite important as well.

If both outputs are not measured in the actual configuration, it is very likely that phase alignment will not be correct.

4.6.3 Consequences of badly aligned systems

Mis-aligned systems have lower efficiency: i. e. for the same SPL you would be obliged to drive the system harder, activating the displacement & temperature protection at lower output levels. Both sound quality and reliability will decrease as the system is stressed. In certain situations you will even need more speakers to do the same job.

4.6.4 Precautions & Checks

- Before using the AUX send of your desk, ensure that the outputs are in phase (you can feed a 1000Hz signal at the input and monitor the MAIN and AUX outputs on a dual trace oscilloscope).
- Always apply EQ or processing on both channels at once, so that the phase relationship will not be altered.
- Never add additional low pass filtering on the SUB or high pass filtering on the main system.
- Inverting polarity on one channel should always result in a massive difference near the crossover point. If the sound is more or less the same the system is no longer aligned.

5 GEO T TANGENT ARRAY SYSTEM CHECK LIST

It is essential to execute all these check steps prior to perform a sound check on the "front end" to the system. Following this checklist step by step will prevent many troubles and will save time in the end.

5.1 Are the NX242 Digital TDcontrollers properly configured?

IMPORTANT

If you must change any of the parameters listed above, make sure that you use the same values on all NX242's.

5.1.1 NX242 Load 2.13 and below

Freq. Band	Gain	Global Gain	Amp Power	Delay	Sense Gain	Array EQ	Headroom
HF	32 dB	0 dB	1350 Watts	0 ms	0 dB	0 dB	5 bars
LF (rear)	32 dB	0 dB	2600 Watts	0 ms	0 dB	0 dB	5 bars
MF/LF (front)	32 dB	0 dB	2600 Watts	0 ms	0 dB	0 dB	5 bars
CD18 Sub	26 dB	0 dB	2000 Watts	0 ms	0 dB	0 dB	5 bars

5.1.2 NX242 Load 2.14 and above

Freq. Band	Gain	Global Gain	Amp Power	Delay	Sense Gain	Array EQ	Headroom
HF	26 dB	0 dB	1350 Watts	0 ms	0 dB	0 dB	5 bars
LF (rear)	32 dB	0 dB	2600 Watts	0 ms	0 dB	0 dB	5 bars
MF/LF (front)	32 dB	0 dB	2600 Watts	0 ms	0 dB	0 dB	5 bars
CD18 Sub	26 dB	0 dB	2000 Watts	0 ms	0 dB	0 dB	5 bars

5.2 Are the amplifiers properly configured?

IMPORTANT NOTE FOR BRIDGE MONO MODE OPERATING AMPLIFIERS

- **Bridged mono operating mode adds 6 dB voltage gain.**
- **Phase relation from amplifier input to output 1(+) and 2(+) has to be checked.**

5.2.1 NX242 Load 2.13 and below

Freq. Band	Mode	Gain Switch	Limiter	High Pass
HF	Stereo	32 dB	None	None
LF (rear)	Bridged Mono	26 dB*	None	None
MF/LF (front)	Bridged Mono	26 dB*	None	None
CD18 Sub	Stereo	26 dB	None	None

5.2.2 NX242 Load 2.14 and above

Freq. Band	Mode	Gain Switch	Limiter	High Pass
HF	Stereo	26 dB	None	None
LF (rear)	Bridged Mono	26 dB*	None	None
MF/LF (front)	Bridged Mono	26 dB*	None	None
CD18 Sub	Stereo	26 dB	None	None

5.3 Are the amps and the NX properly connected?

Check that the sense LEDs on the NX242's used for the full range Tangent Array Modules are connected properly by applying a signal to the corresponding output and verifying that the correct Sense LED illuminates.

5.4 Are the speakers properly connected and angled ?

- Attach the first 6 array modules to the bumper.
- Before flying, verify that all channels of all modules are functioning properly.
- Make sure that each module is producing the proper front/rear summation: when listening from behind the array, switch the front drivers in and out. You should hear a reduction in the LF range when the both front and rear drivers are on as compared to when the rear drivers only are on. When listening from the front, you should hear a strong increase in the LF range when connecting the rear drivers.
- To check that all front elements have the proper amplitude and phase, you should listen to the six box cluster at a close distance (<1 meter). You should be able to move from the top to the bottom of the cluster without hearing any change in the tonal balance.
- Verify that the angle settings are the same on both sides of each module.
- Raise the bumper, attach the next 6 modules and repeat the above checks.
- Make sure that these 6 modules sum properly with the modules above them.
- When all the modules are flown, check that the aiming angles are the same left and right.
- Verify that the CD18 is functioning properly: when listening from behind the subs, summing the front and rear sub drivers lowers the level in comparison with rear driver only.
- Make sure that multiple CD18s are summing properly: 6 dB gain per doubling of quantity.

5.5 Final Pre-Sound Check Check

Play a CD track mono left, and then right : both sides must sound strictly identical. When listening in the center between two Vertical Tangent Arrays, everything from LF to HF should be located to the “phantom center” position. If not, repeat the above check sequence to identify the source of the problem.

6 TECHNICAL SPECIFICATIONS

6.1 GEO T4805 Vertical Tangent Array Module

6.1.1 System specifications

PRODUCT FEATURES	GEO T4805
Components	HF: 1 x 3" voice coil, 1.4" throat neodymium 16 Ohm driver on an hyperboloid reflective wavesource. MF/LF (front-firing): 2 x 8" (20cm) long excursion neodymium hi-flux 16 Ohm drivers in series. LF (rear-firing): 2 x 8" (20cm) long excursion neodymium hi-flux 16 Ohm drivers in series.
Height x Width x Depth	286 x 903 x 627 mm (11 1/4" x 35 1/2" x 24 5/8") including array assembly system
Shape	5° Trapezoid.
Weight: net	52 kg (114.6 lbs) including array assembly system.
Connectors	1 x AMPHENOL EP6 6 pole socket In; 1 x AMPHENOL AP6 6 pole connector Through.
Construction	Main structure: Baltic birch ply with structured black coating. Rear section: Aluminum with dark grey coating.
Front finish	Injected polyurethane flange, metallic gray coating (structured black on request).
Flying points	Integral flying system. Intercabinet angle adjustments = 0.125°, 0.2°, 0.315°, 0.5°, 0.8°; 1.25°, 2.0°, 3.15°, 5° (logarithmic steps)
SYSTEM SPECIFICATIONS	**GEO T4805 with NX242 TDcontroller**
Frequency response [a]	67 Hz – 19 kHz ± 3 dB
Usable range @-6dB [a]	60 Hz – 20 kHz
Sensitivity 1W @ 1m [b]	109 dB SPL nominal (107 dB SPL wideband)
Peak SPL @ 1m [b]	Configuration dependent [d].
Dispersion [c]	Vertical plane: Configuration dependent [d]. Horizontal plane: 90°. Low Frequency: cardioid
Crossover frequencies	LF-MF: 250 Hz active; MF-HF: 1.3 kHz active
Nominal impedance	HF: 16 Ohm; LF/MF front: 32 Ohm; LF rear: 32 Ohm
Recommended amplifiers	HF: 2700 Watts into ~3 Ohm (6 cabinets parallel per amp channel). MF/LF front: 5200 Watts into ~6 Ohm (6 cabinets parallel per bridged mono amp). LF rear section: 5200 Watts into ~6 Ohm (6 cabinets parallel per bridged mono amp).
SYSTEM OPERATION	
Electronic controller	The NX242 Digital TDcontroller presets are precisely matched to the GEO T Series cabinets and include sophisticated protection systems as well as advanced cardioid directivity DSP algorithms. Using GEO T Series cabinets without a properly connected NX242 will result in poor sound quality and can damage components.
Array design	Arrays of less than 6 x GEO T4805 will provide poor dispersion control and are neither recommended nor supported.
Sub-bass	CD18 directional sub extends system low frequency response down to 25 Hz
Speaker cables	HF: wired 5(-) / 6(+). MF/LF front section: wired 3(-) / 4(+). LF rear section: wired 1(-) / 2(+).
Rigging System	Please refer to the GEO user manual before any operation.

As part of a policy of continual improvement, NEXO reserves the right to change specifications without notice.

[a] Response curves and data: anechoic far field above 200 Hz, half-space anechoic below 200 Hz.

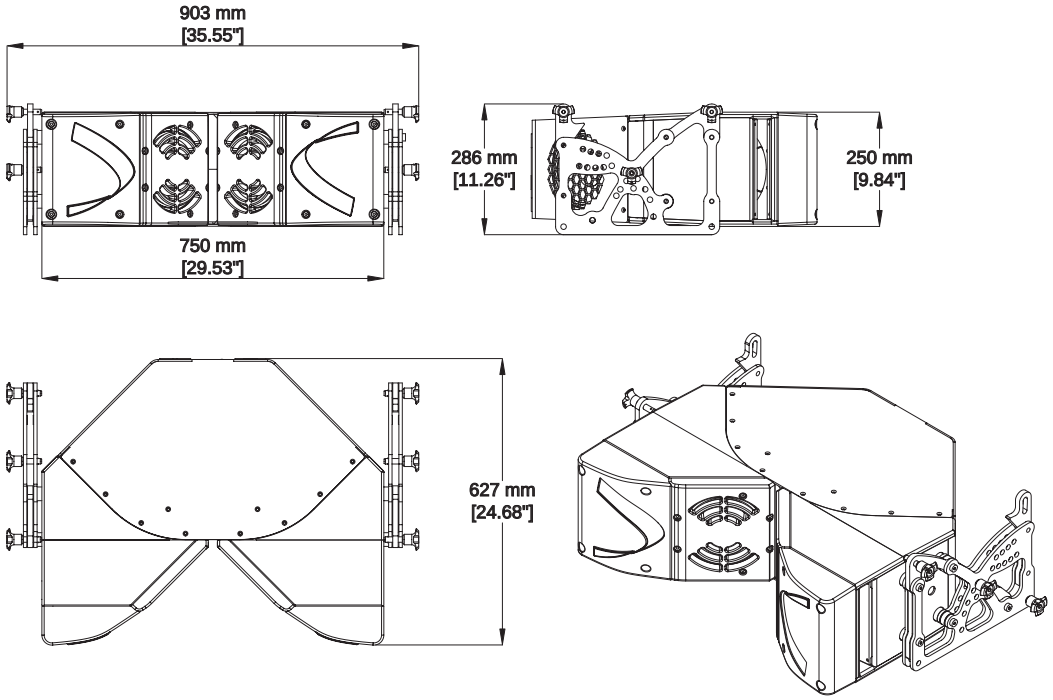
[b] Sensitivity & peak SPL: will depend on spectral distribution. Measured with band limited pink noise. Refers to the specified +/- 3 dB range. Data are for speaker + processor + recommended amplifier combinations.

[c] Directivity curves and data: 1/3 octave smoothed frequency response, normalized to on-axis response. Data obtained by computer processing of off-axis response curves.

[d] Please refer to the GEO T user Manual.

Usable range data: frequency response capability with TD crossover slopes removed.

6.1.2 GEO T4805 Dimensions



6.1.3 Architects' & Engineers' Specifications

The 3-way full range tangent array module shall have four 8 inch 16 Ohm long excursion neodymium hi-flux cone transducers in series (two front-firing, two rear-firing), and a 1.4 inch exit 16 Ohm neodymium compression driver on a hyperboloid reflective wavesource. Coverage shall be configuration-dependent in the vertical plane and 90° in the horizontal plane. The system shall have a nominal sensitivity of 109dB (107dB wideband). When driven by a NEXO NX242 Digital TDcontroller properly connected to amplification capable of delivering 5200 Watts into a 5 Ohm load (6 cabinets per channel in parallel), the system shall produce 138dB peak SPL at 1 meter (for a single enclosure: configuration-dependent when arrayed) with a frequency response of 67 Hz to 19 kHz ±3 dB (60 Hz to 20 kHz ±6 dB). The system shall have an active crossover with crossover points of 250 Hz and 1.3 kHz. Low frequency directional control shall be achieved with DSP algorithms. Electrical connections shall be made via one 6 pole AMPHENOL EP6 socket and one 6 pole AMPHENOL EP6 plug. The system shall have a tuned ported 5° trapezoidal enclosure constructed of 18 ply Baltic birch (midsection) and aluminium (rear driver compartment), finished in structured black coating and having exterior dimensions no greater than 286mm H x 903mm W x 627mm D (11 1/4 in H x 35 1/2 in W x 24 5/8 in D): the system shall weigh 52kg (114.6 lbs). Exterior hardware shall include an integral array assembly system with logarithmic steps and 0.01° precision: interior components shall be protected by an injection-molded polyurethane Configurable Directivity Device flange. The full range system shall be the NEXO GEO T4805 with a NEXO NX242 Digital TDcontroller. Other integrated loudspeaker/controller systems shall be acceptable, provided submitted results of testing by an independent laboratory verify that the above specifications are equalled or exceeded.

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6.2 GEO T2815 Vertical Tangent Array Module

6.2.1 System specifications

PRODUCT FEATURES	GEO T2815
Components	HF: 1 x 3" voice coil, 1.4" throat neodymium 16 Ohm driver on an hyperboloid reflective wavesource. MF/LF: 2 x 8" (20cm) long excursion neodymium hi-flux 16 Ohm drivers in series. Rear Passive Acoustic Resistor
Height x Width x Depth	249 x 903 x 537 mm (9 13/16" x 35 1/2" x 21 1/8") including array assembly system
Shape	15° Trapezoid.
Weight: net	29 kg (63.9 lbs) including array assembly system.
Connectors	1 x AMPHENOL EP6 6 pole socket In; 1 x AMPHENOL AP6 6 pole connector Through.
Construction	Main structure: Baltic birch ply with structured black coating. Rear section: Aluminum with dark grey coating.
Front finish	Injected polyurethane flange, metallic gray coating (structured black on request).
Flying points	Integral flying system. Intercabinet angle adjustments = 6.30°, 8.00°, 10.0°, 12.5°, 15° (logarithmic steps)
SYSTEM SPECIFICATIONS	**GEO T2815 with NX242 TDcontroller**
Frequency response [a]	85 Hz – 19 kHz ± 3 dB
Usable range @-6dB [a]	77 Hz – 20 kHz
Sensitivity 1W @ 1m [b]	107 dB SPL nominal (105 dB SPL wideband)
Peak SPL @ 1m [b]	Configuration dependent [d].
Dispersion [c]	Vertical plane: Configuration dependent [d]. Horizontal plane: 120°. Low Frequency: cardioid
Crossover frequencies	LF/MF-HF: 1.3 kHz active
Nominal impedance	HF: 16 Ohm; LF/MF: 32 Ohm
Recommended amplifiers	HF: 2700 Watts into ~3 Ohm (6 cabinets parallel per amp channel). MF/LF: 5200 Watts into ~6 Ohm (6 cabinets parallel per bridged mono amp).
SYSTEM OPERATION	
Electronic controller	The NX242 Digital TDcontroller presets are precisely matched to the GEO T Series cabinets and include sophisticated protection systems as well as advanced cardioid directivity DSP algorithms. Using GEO T Series cabinets without a properly connected NX242 will result in poor sound quality and can damage components.
Array design	Arrays of less than 4 x GEO T2815 will provide poor dispersion control and are neither recommended nor supported.
Sub-bass	CD18 directional sub extends system low frequency response down to 25 Hz
Speaker cables	HF: wired 5(-) / 6(+). MF/LF: wired 3(-) / 4(+). 1(-) / 2(+) not connected (through).
Rigging System	Please refer to the GEO user manual before any operation.

As part of a policy of continual improvement, NEXO reserves the right to change specifications without notice.

[a] Response curves and data: anechoic far field above 200 Hz, half-space anechoic below 200 Hz.

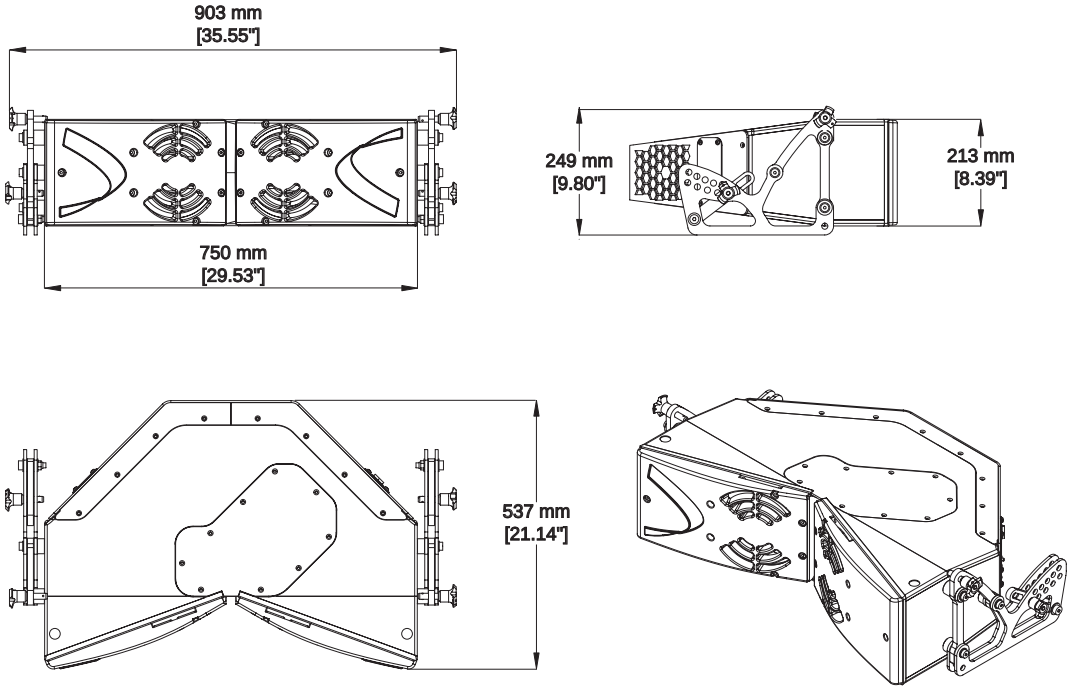
[b] Sensitivity & peak SPL: will depend on spectral distribution. Measured with band limited pink noise.
Refers to the specified +/- 3 dB range. Data are for speaker + processor + recommended amplifier combinations.

[c] Directivity curves and data: 1/3 octave smoothed frequency response, normalized to on-axis response. Data obtained by computer processing of off-axis response curves.

[d] Please refer to the GEO T user Manual.

Usable range data: frequency response capability with TD crossover slopes removed.

6.2.2 GEO T2815 Dimensions



6.2.3 Architects' & Engineers' Specifications

The 2-way full range tangent array module shall have two 8 inch 16 Ohm long excursion neodymium hi-flux cone transducers in series, two rear passive acoustic resistors and a 1.4 inch exit 16 Ohm neodymium compression driver on a hyperboloid reflective wavesource. Coverage shall be configuration-dependent in the vertical plane and 120° in the horizontal plane. The system shall have a nominal sensitivity of 107dB (105dB wideband). When driven by a NEXO NX242 Digital TDcontroller properly connected to amplification capable of delivering 5200 Watts into a 5 Ohm load (6 cabinets per channel in parallel), the system shall produce 135dB peak SPL (for a single enclosure: configuration-dependent when arrayed) with a frequency response of 85 Hz to 19 kHz ±3 dB (77 Hz to 20 kHz ±6 dB). The system shall have an active crossover with DSP algorithms and a crossover point of 1.3 kHz. Electrical connections shall be made via one 6 pole AMPHENOL EP6 socket and one 6 pole AMPHENOL EP6 plug. The system shall have a 15° trapezoidal enclosure constructed of 18 ply Baltic birch (midsection) and aluminium, finished in structured black coating and having exterior dimensions no greater than 249mm H x 903mm W x 537mm D (9 13/16 in H x 35 1/2 in W x 21 1/8 in D): the system shall weigh 29kg (63.9 lbs). Exterior hardware shall include an integral array assembly system with logarithmic steps and 0.01° precision: interior components shall be protected by an injection-molded polyurethane Configurable Directivity Device flange. The full range system shall be the NEXO GEO T2815 with a NEXO NX242 Digital TDcontroller. Other integrated loudspeaker/controller systems shall be acceptable, provided submitted results of testing by an independent laboratory verify that the above specifications are equalled or exceeded.

6.3 CD18 Directional Sub-Bass

6.3.1 System specifications

PRODUCT FEATURES	CD18
Components	2 x 18" (46cm) long excursion neodymium 8 Ohm drivers
Height x Width x Depth	750 x 1200 x 750 mm (29 1/2" x 47 1/4" x 29 1/2")
Shape	Rectangular
Weight: Net	116 kg (256 lbs)
Connectors	2 x NL4MP SPEAKON 4 pole (In & Through)
Construction	Baltic birch ply finish with structured black coating. Dark grey carpet finish also available.
Flying points	Integral flying system.
SYSTEM SPECIFICATIONS	**CD18 with NX242 TDcontroller**
Frequency Response @-3dB [a]	32 Hz – 80 Hz
Usable Range @-6dB [a]	29 Hz – 180 Hz
Sensitivity 1W @ 1m [b]	105 dB SPL Nominal
Peak SPL @ 1m [b]	142-145 dB Peak
Dispersion [c]	Cardioid pattern over the entire useable bandwidth (two channels of the NX242 are used for the process).
Directivity Index [c]	Q = 4.3 & DI = 5.3 dB over the entire useable bandwidth.
Crossover Frequency	80 Hz active through NX242 Digital TDcontroller.
Nominal Impedance	2 x 8 Ohm
Recommended Amplifiers	2 amplifier channels are required for directional operation, each rated at 1000 to 2000 Watts into 8 Ohm per channel.
SYSTEM OPERATION	
Electronic Controller	The NX242 Digital TDcontroller presets are precisely matched to the CD18 and include sophisticated protection systems. Using the CD18 subbass without a properly connected NX242 Digital TDcontroller will result in poor sound quality and can damage components.
Speaker Cables	The front loudspeaker of the CD18 is wired 2+ & 2- while the rear loudspeaker is wired 1- & 1+. The CD18 must use separate cables from the main system.
Rigging System [d]	Please refer to the user manual before any operation.

As part of a policy of continual improvement, NEXO reserves the right to change specifications without notice.

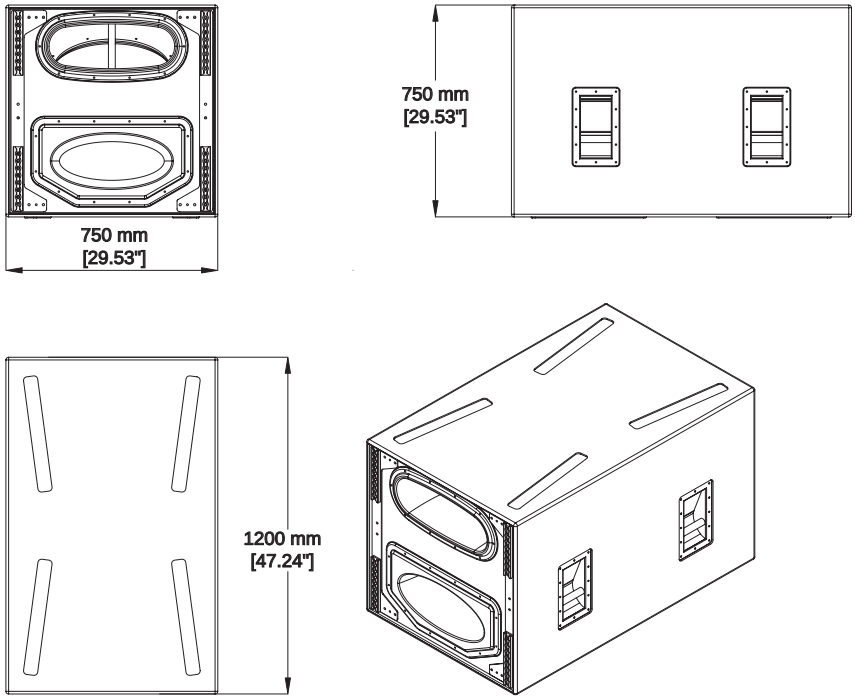
[a] Response curves and data: anechoic far field above 400 Hz, half-space anechoic below 400 Hz.
Usable range data: frequency response capability with TD crossover slopes removed.

[b] Sensitivity & peak SPL: will depend on spectral distribution. Measured with band limited pink noise.
Refers to the specified +/- 3 dB range. Data are for speaker + processor + recommended amplifier combinations.

[c] Directivity curves and data: 1/3 octave smoothed frequency response, normalized to on-axis response. Data obtained by computer processing of off-axis response curves.

[d] Please refer to the user manual.

6.3.2 CD18 dimensions

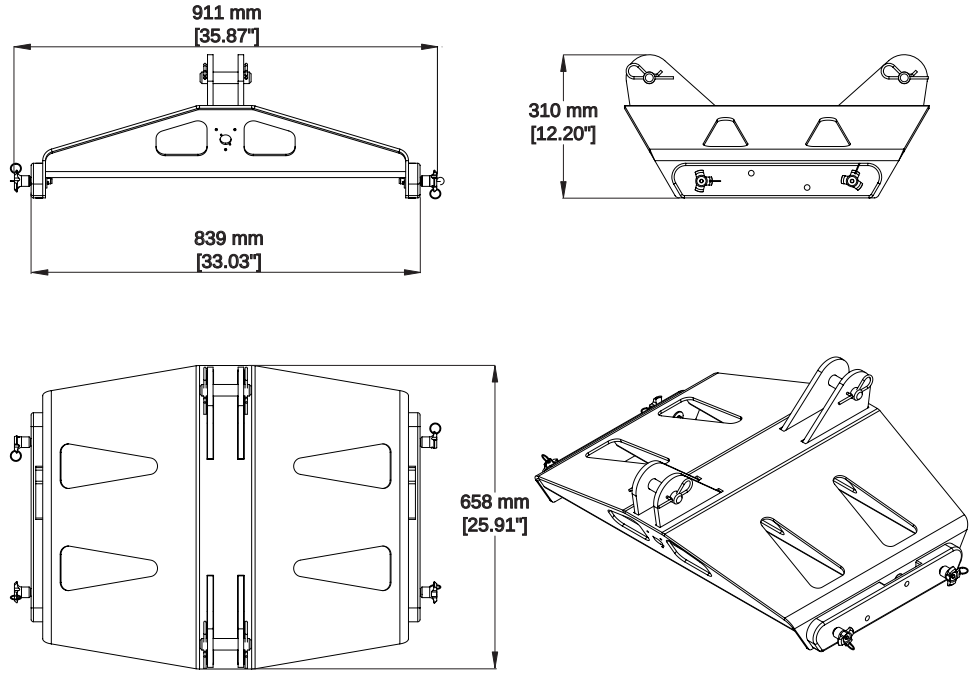


6.3.3 Architects' & Engineers' Specifications

The subbass loudspeaker system shall have two 18 inch long excursion 8 Ohm cone transducers. Its horizontal and vertical dispersion shall be 120° (cardioid pattern). The system shall have a Q of 4.3 (cardioid mode) over is entire operating frequency range. The system shall have a nominal sensitivity of 105dB/1W/1m. When driven by a NEXO NX242 Digital TDcontroller properly connected to amplification capable of delivering 1000 to 2000 Watts into a 2x 8 Ohm load (two channels required for directional VLF), the system shall produce 142 to 145dB peak SPL with a frequency response of 32 Hz to 80 Hz ±3 dB (29 Hz to 180 Hz ±6 dB). The system shall have an active crossover with DSP algorithms for directional control of sub bass with a crossover point of 80 Hz. Electrical connections shall be made via two 4 pole NL4MP SPEAKON connectors. The system shall have a tuned dual-ported rectangular enclosure constructed of 18 ply Baltic birch with low speed port geometry, finished in structured black coating or dark grey carpeting and having exterior dimensions no greater than 750mm H x 1200mm W x 750mm D (29 1/2 in H x 47 1/4 in W x 29 1/2 in D): the system shall weigh 116kg (256 lbs). Exterior hardware shall include four front-mounted flytracks, four rear-mounted flytracks and four handles. The subbass system shall be the NEXO GEO CD18 with a NEXO NX242 Digital TDcontroller. Other integrated loudspeaker/controller systems shall be acceptable, provided submitted results of testing by an independent laboratory verify that the above specifications are equalled or exceeded.

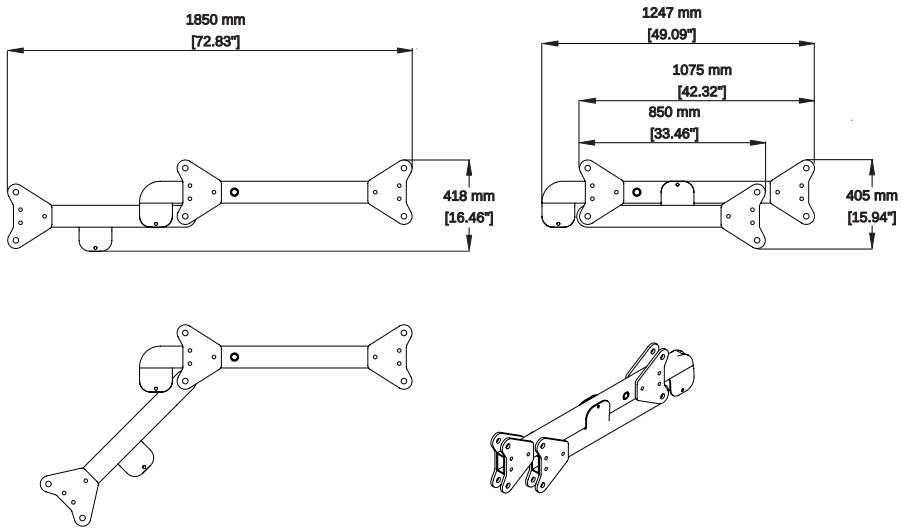
6.4 GEO T Rigging system

6.4.1 GEO T Bumper



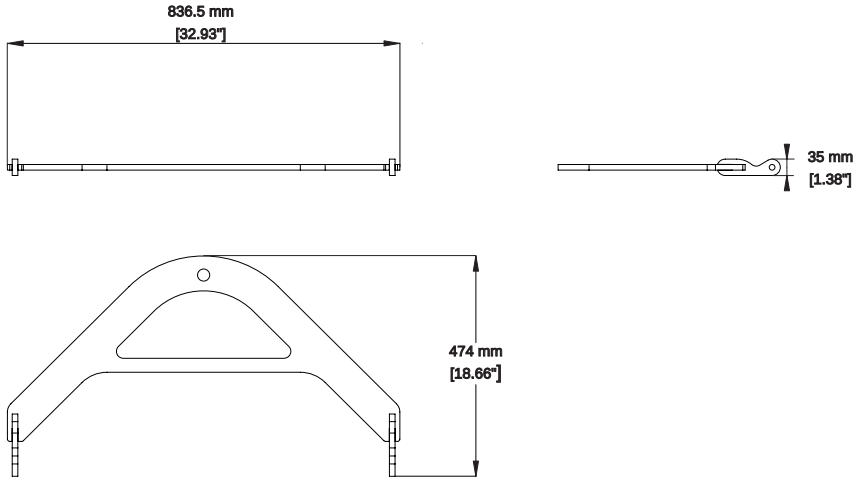
WEIGHT : 45 KG / 99.2 LBS

6.4.2 GEO T Kelping Beam



WEIGHT : 53 KG / 116.8 LBS

6.4.3 GEO T Bottom Bumper



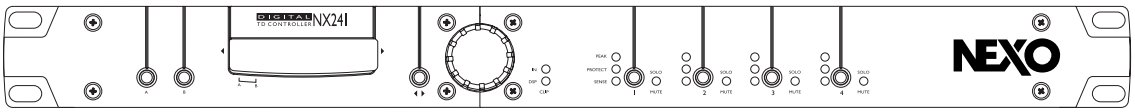
WEIGHT: 9.5 KG / 20.9 LBS

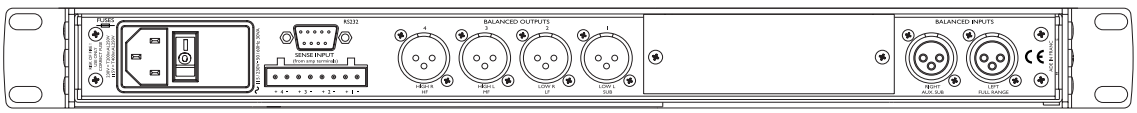
6.5 NX242 TDcontroller

6.5.1 Specifications

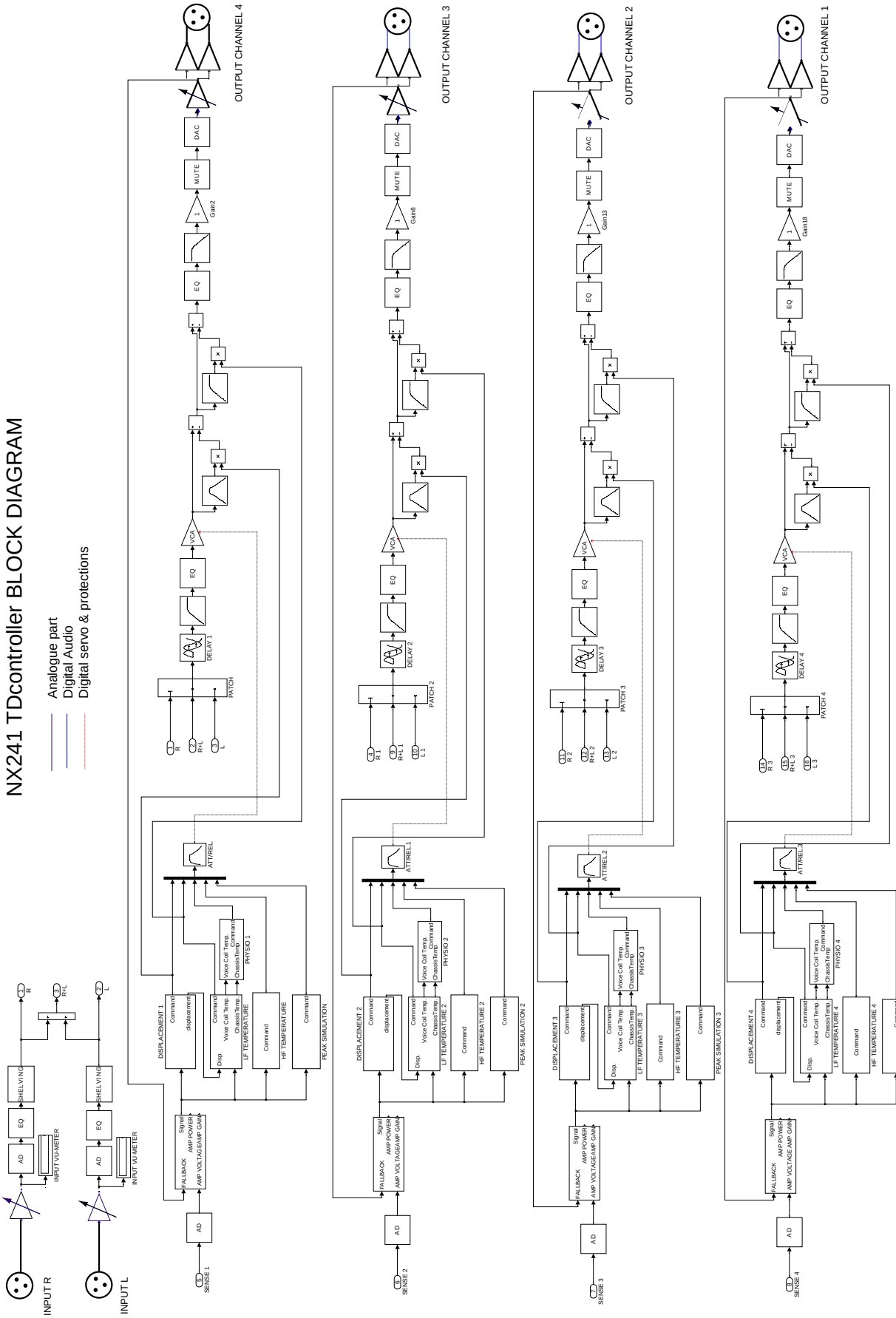
SPECIFICATIONS	NX242 Digital TDcontroller
Output Level	+28 dBu Max. into 600 Ohm load
Dynamic Range	Channels 1 & 2 = 99 dBu Channel 3 & 4 = typical 107 dBu. (Flat without gain scaling: 101dBu)
THD + Noise	< 0.02% flat setup (max0.04% for Output 27.5dBu)
Latency time	1.4ms on a flat setup
Power Supply	115/230 Volts 50/60 Hz (operating range 90-125V & 180-264V)
FEATURES	
Audio Inputs	2 Audio Inputs 24 bit converters Electronically Balanced, 36 k Ohm. 2 XLR-3F Connectors.
Sense Inputs	4 Amplifier Sense Inputs (LF mono, MF/HF L&R) Floating 150 kΩ. 18 bit converters 8 Pole Removable Strip Terminal.
Audio Outputs	4 Audio Outputs. 24 bit converters Electronically balanced, 50 Ohm 4 XLR-3M connectors
Processing	24 bit data with 48-bit accumulator. 100MIPS Optional Expansion Board 300MIPS
Front Panel	Menu A and Menu B buttons 16 characters by 2 lines display Select Wheel & Enter button (◂ ▸) IN Clip – DSP Clip red LED's Speaker Protection yellow LED for each channel Individual Mute/Solo buttons and red LED for each channel Amp. Sense & Peak (green & red) LED's for each channel
FLASH EPROM	Software updates/upgrades, new system setups, available on www.nexo-sa.com
Rear Panel	90-240 V Fuse holder RS232 connector for serial com Empty slot for extension card (communication & processing power)
Dimensions & Weight	1U 19" Rack - 230 mm (9") Depth. 4 kg

6.5.2 Front and Rear Panel view



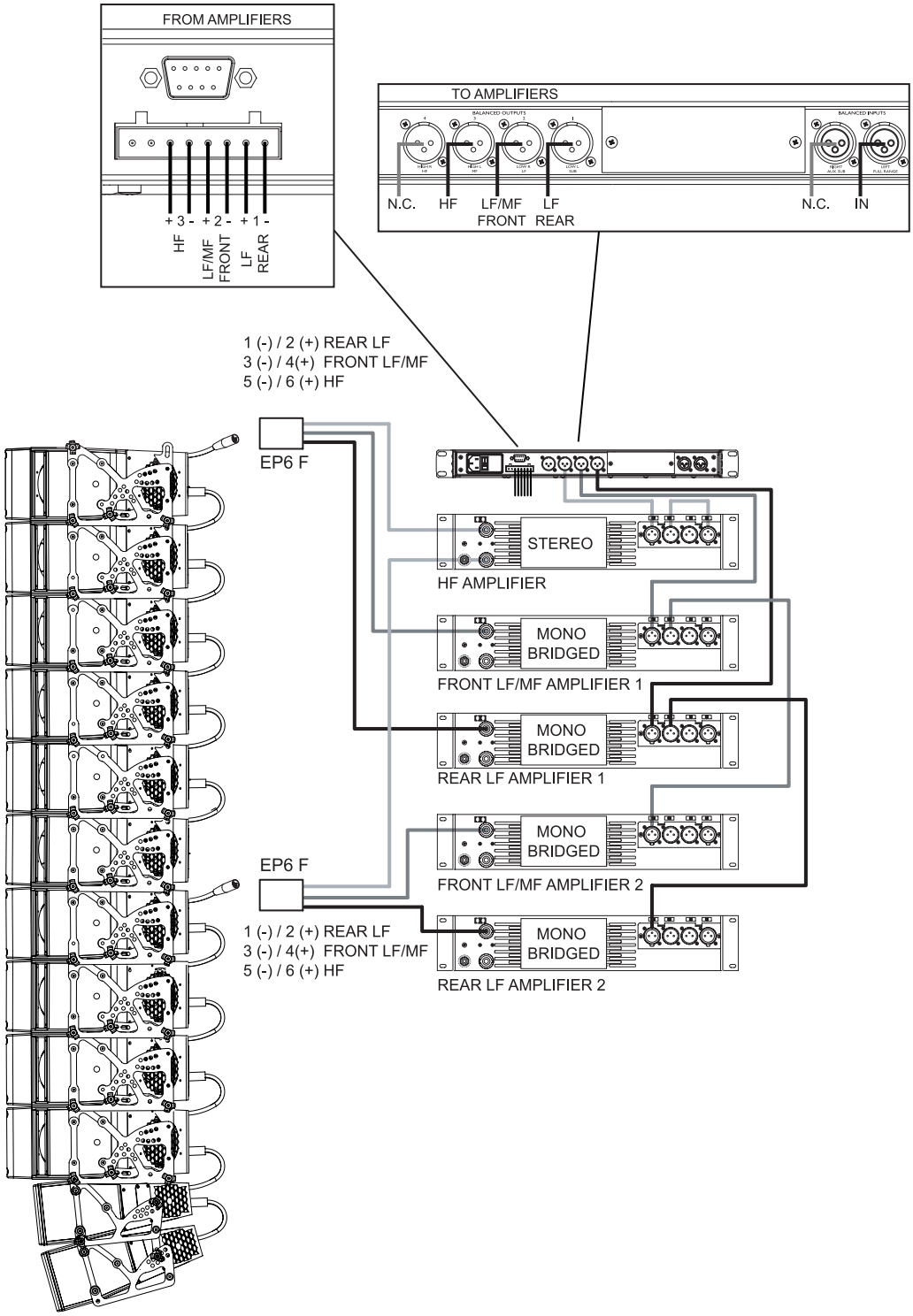


6.5.3 Block Diagram

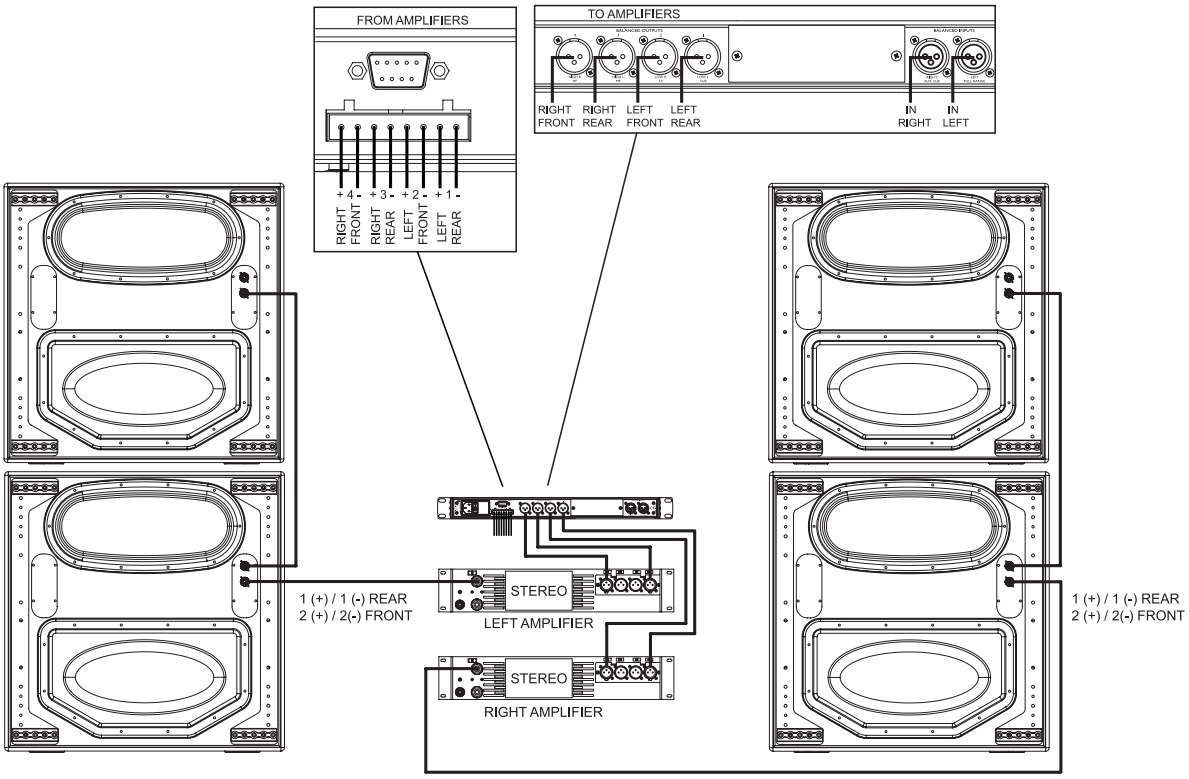


7 CONNECTION DIAGRAMS

7.1 GEO T4805 / T2815 to amplifiers and NX242

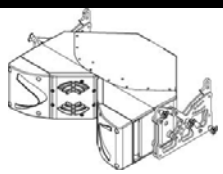
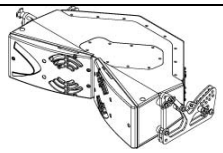
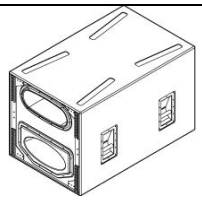
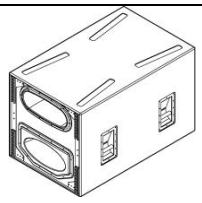


7.2 CD18 to amplifiers and NX242

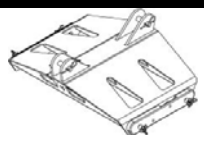
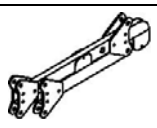


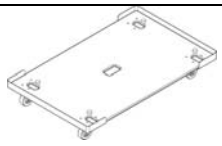
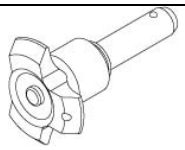
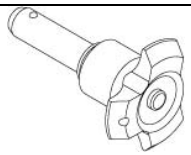
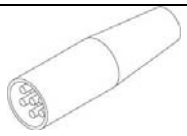
8 GEO T SERIES PARTS & ACCESSORIES LIST

8.1 Array Modules & Control Electronics List

MODEL	DRAWING	DESCRIPTION
GEO T4805		GEO 4x 8” Neodymium 5° Module (+6x BLGEOT 12-30)
GEO T2815		GEO 2x 8” Neodymium 15° Module (+4x BLGEOT 12-30)
CD18-C		CD18 2x 18" Carpeted Cardioid
CD18-P		CD18 2x 18" Painted Cardioid
ANX 242		Digital TDcontroller for PS, Alpha and Geo series

8.2 Accessories List

MODEL	DRAWING	DESCRIPTION
GEOT-BUMPER		Main Geo T Bumper (4x BLGEOT 12-35 included)
GEOT-BCCH		Compression Mode Kelping Chain
GEOT-BTBUMPER		Geo T Bottom Bumper
GEOT-KELPBEAM		Geo T Kelping Beam

MODEL	DRAWING	DESCRIPTION
LEVA1500		Chain Lever Hoist 1.5 tonne (9 meters chain)
GEOT-RAINCO		Geo T Waterproof Back Cover (up to 6 cabinets)
GEOT-BPRAINCO		Geo T Bumper Waterproof Back Cover
CD18-WB		CD 18 WheelBoard
BLGEOT12-30		GEO T 12mm x 30mm Quick Release Pin
BLGEOT12-35		GEO T Bumper 12mm x 35mm Quick Release Pin
GEOT-CABLE		1m Linking Cable For Geo T4805/T2815
GEOT-613F		EP6 Female Connector
GEOT-612M		AP6 Male Connector

9 RECOMMENDED INSTALLATION TOOLS AND EQUIPMENT

- Tape measure – should be 30m/100ft in length and be of durable fibre material. Have one per array available to speed up the installation process.
- Laser inclinometer – For measuring vertical and horizontal angles in the venue. An ideal product is the Calpac 'Laser projecting a dot' version which costs approximately €60.
- Spirit level – used to ascertain the trueness of the surface from which the angle measurements originate.
- Rangefinder measuring device – either a Disto type laser measure or an optical laser rangefinder can be used. Devices such as the Bushnell 'Yardage Pro' sports rangefinders provide sufficiently accuracy and are easy to use. They have the additional advantage of working very well in bright sunlight.
- Electronic calculator with trigonometric functions to calculate the height from ground level to points in the room. The formula to calculate height of a point from measured angle and distance is:
- Height of point = Sin(vertical angle in degrees) x distance to point
- NB: Take care when using spreadsheets as they calculate using radians by default. To convert degrees to radians use the formula:
- Angle (in radians)=3.142 x Angle (in degrees)/180
- Computer – Laptop or Desktop PC running Windows 95/98/2000 or XP with the current version of NEXO GeoSoft installed. It is not possible to configure a Geo tangent array properly without using GeoSoft. Note that, when GeoSoft designs are prepared prior to arrival at the venue, it is often necessary to modify or update the design to accommodate special circumstances. A PC is absolutely essential to make such changes.
- Digital remote inclinometer – with a remote sensor in the bumper and a meter unit at ground level to ensure precise installation of the cluster. A typical unit for this purpose is the Schaevitz Anglestar which typically costs around €350 for a sensor and meter unit pair. At greater cost but with very high precision is the NEXO GeoSight system that predicts the stationary angle of the array, even while it is swinging, and has a green laser mounted coincident to and parallel with the axis of the topmost cabinet.
- Audio Analysis Software – recommended but not absolutely essential, programs such as SIA Smaart Pro or Spectrafoo enable rapid and detailed analysis of the installation. Consider taking a training course in using one of these tools if you are not already competent with them – it will pay dividends in increased performance of the system.

10 USER NOTES

France

Nexo S.A.
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ZAC des PARIS NORD II B.P.
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Fax: +33 1 48 63 24 61
E-mail: info@nexo.fr

www.nexo-sa.com

TÜV NORD

Zertifikat

Certificate

Registrier-Nr.
Registered No.

381/06 Rev. 1

Zeichen des Auftraggebers *Customer´s reference*	Auftragsdatum *Date of order*	Aktenzeichen *File reference*	Prüfbericht Nr. *Test report no.*
Hr. Deffrages	05.04.2005	2.4- 4255/05 Brau / A05	2645/05

Name und Anschrift des Auftraggebers

NEXO S.A.
154 alée des Erables
95950 Roissy CDG Cedex
Frankreich

Name and address of the customer

ist berechtigt, das unten genannte Produkt mit dem abgebildeten Zeichen zu kennzeichnen

TÜV NORD Zertifizierung Baumuster geprüft

is authorized to provide the product mentioned below with the mark as illustrated

Fertigungsstätte

NEXO S.A.
154 alée des Erables
95950 Roissy CDG Cedex
Frankreich

Manufacturing plant

Geprüft nach

BGV C1: 1998
DIN 18800-1: 1990

Tested in accordance with

Beschreibung des Produktes (Details s. Anlage 1)

Flugvorrichtung für ein Lautsprechersystem Typ Geo T
array assembly system for a loudspeaker system type Geo T

Description of product (Details see Annex 1)

TÜV NORD CERT GmbH
Zertifizierungsstelle für Gerätesicherheit und Medizinprodukte

Gültig bis: **18.01.2011**
Valid until: *18.01.2011*

Essen, 18.01.2006

Bitte beachten sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf

Langemarckstr. 20 • 45141 Essen • Fon +49 (0)201 825 5120 • Fax +49 (0)201 825 3209

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The right to use the approval mark shown overleaf is granted only for those products which are identical with the prototype that has passed the test, the statements in the test report and the supplementary agreements.

Each product must be accompanied by the instructions which are necessary for its operation and installation. Each product must bear a distinct indication of the manufacturer or importer and a type designation so that the identity of the tested prototype with the series product brought on the market can be checked.

The recipient of the TÜV NORD - Certificate shall currently supervise the manufacture of the products provided with the approval mark for compliance with the test specifications and particularly shall properly conduct the checks which are stated in the specifications or required by the test laboratory.

In addition to the conditions stated above, all other provisions of the General Agreement are applicable to the TÜV NORD - Certificate. It will be valid as long as the rules of technology on which the test was based are valid, unless it is revoked before pursuant to the provisions of the General Agreement.

The TÜV NORD - Certificate will become invalid and shall be returned to the certification body without delay when it has expired or revoked.

RWTÜV Systems GmbH
Member of TÜV NORD Group

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45141 Essen
Germany

Phone: +49 (0) 201 825-0
Fax: +49 (0) 201 825-2517

www.tuev-nord.com

Test report
No. 2645/05

about the test of a technical equipment

Applicant: NEXO S.A.
154 alée des Erables
95950 Roissy CDG Cedex
France

Order No.: 20674391/10

This report contains 3 text pages.

Designed: 04.10.2005 by: U Brau

Reviewed: 04.10.2005 by: i.V. M/S

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Applicant:	NEXO S.A. 154 alée des Erables 95950 Roissy CDG Cedex France
Reference/Equipment:	array assembly system for a loudspeaker system type Geo T
Rating:	dead weight per unit: Geo T4805 = 53 kg Geo T2815 = 29 kg CD 18 = 116 kg max. system load: 2000 kg max. permitted angle between the loudspeaker cabinets: bumper and Geo T4805 = 0° Geo T4805 and Geo T4805 = 5° Geo T4805 and Geo T2805 = 10° Geo T2805 and Geo T 2805 = 15° max. wind speed: 27 m/s (8 Beaufort)
Date of receipt:	14.01.2004
Type of examination:	type approval
Test regulations:	BGV C1: 1998 DIN 18800-1:1990
Testing period:	04.2005-09.2005
Test location:	Technology centre of RWTÜV Systems GmbH Manufacturer (Roissy)
Annex (No. of pages):	-

1. Documentation:

The following documentation has been used for the test:

- Structural analysis for the Geo T assembly system pages 1-48 dated 06.2004. The Structural analysis has been performed in respect of the DIN 18800 ff.
- Manual for the Geo T System pages 1-55
- Manual for the Software GEOSOFT 2.0

2. Remarks:

Only the mechanical components have been the subject of the type approval.

3. Test result:

All parts of the above described array assembly system for a loudspeaker system are sufficient dimensioned.
Assemblies of the above described array assembly system need to be tested at the final location of use before initial operation.